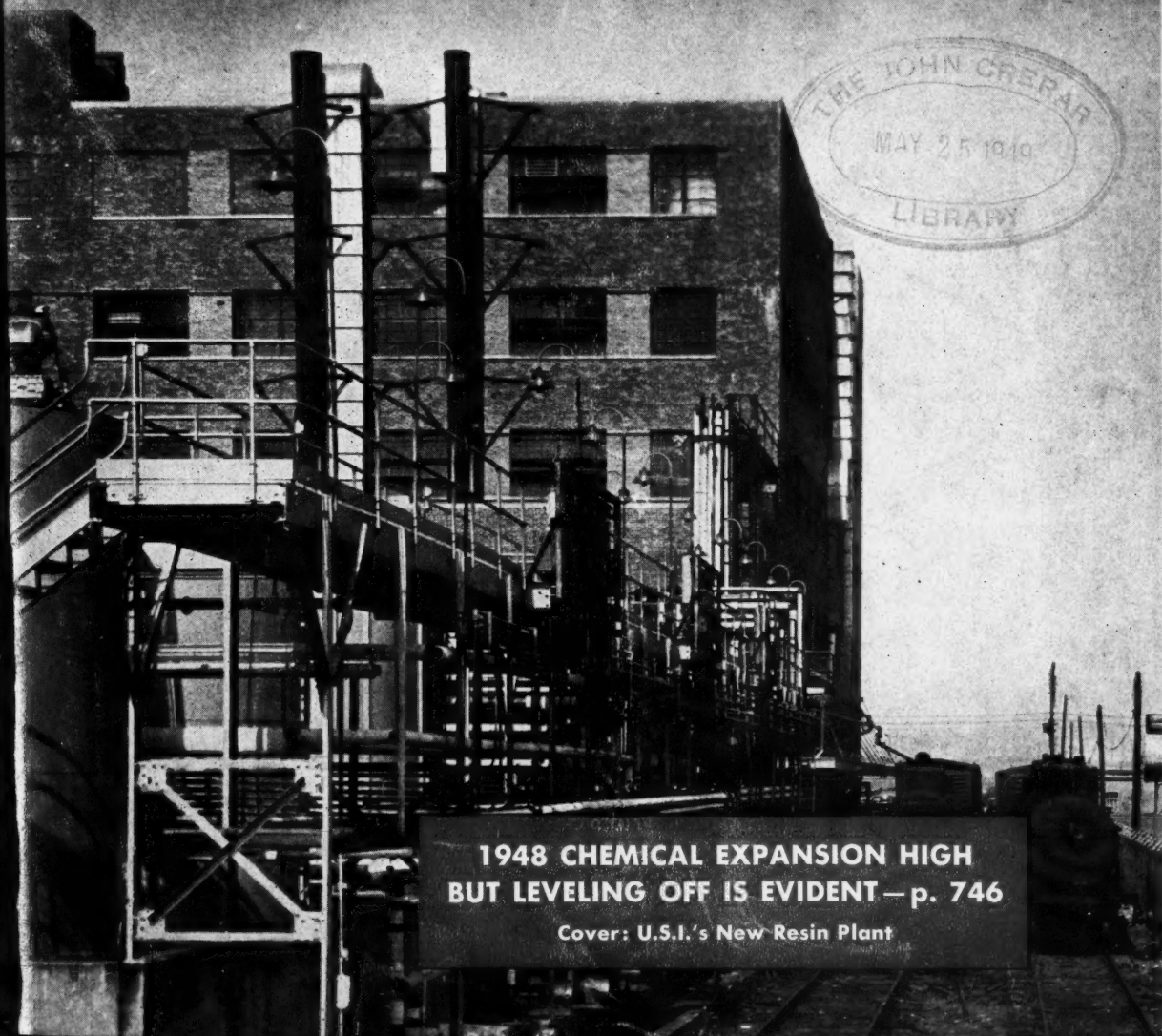


1949

Chemical Industries

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**1948 CHEMICAL EXPANSION HIGH
BUT LEVELING OFF IS EVIDENT—p. 746**

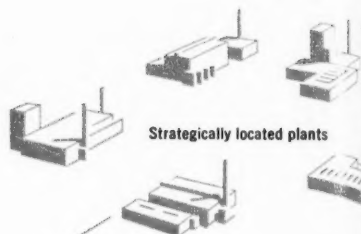
Cover: U.S.I.'s New Resin Plant



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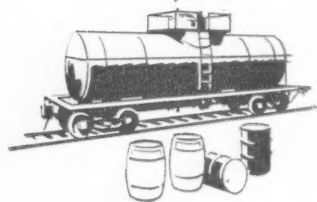


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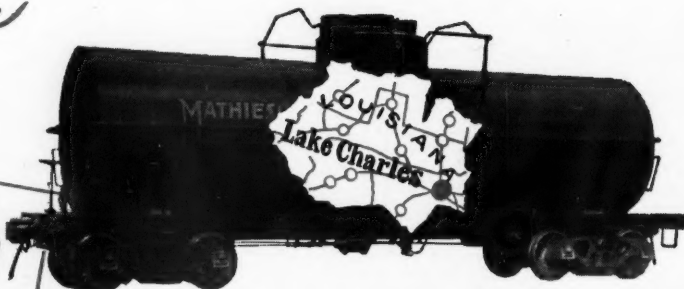


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Chemical Industries

Vol. 64, No. 5

MAY 1949

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

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May

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THE READER WRITES

German Phthalic Catalyst

To the Editor of Chemical Industries:-

I found the article on the German phthalic anhydride catalyst in your April issue particularly interesting, having worked on processes and plants for phthalic anhydride for many years. I was one of those who visited the German phthalic plants in the Summer of 1945 and believe I wrote one of the first reports on the plant at Schkopau, including a section on the manufacture of the I. G. phthalic anhydride catalyst after discussions with the chemists who made this contact material at Ludwigshafen.

In view of the excellent yield obtained with the I. G. catalyst—much higher than obtained in American practice—I hoped there would be much interest in the material on the part of American phthalic manufacturers. However, though my report and those of others were available to all, there seemed to be little interest in the catalyst, it being complained that since the time of contact required was approximately four times greater than with the more active catalyst used in the U. S. A. this would necessitate the building of much larger converters to give the

same output. While it is true that the contact time is much greater and, consequently, the output per catalyst tube of a given size is much lower, it is also true that for the same reason a converter tube of larger diameter can be used, that is, one about twice the diameter or with four times the cross-sectional area of the tubes used in American practice under the same conditions. This greatly reduces the additional cost of a converter of equivalent output using the I. G. catalyst. With the scarcity of naphthalene and its much increased cost compared to pre-war conditions, the use of the German catalyst seems to me very well justified.

I think Davison Chemical and Sherwin-Williams, who I understand worked with them on the preparation of the I. G. catalyst, deserve a lot of credit for going ahead with this development. It must be admitted, of course, that it was much simpler to adjust the Sherwin-Williams fluid catalyst process to use the I. G. catalyst in the form of a powder suited to fluidization than to change the fixed bed converters used by all the other phthalic anhydride producers.

JOHN W. LIVINGSTON
Plandome, N. Y.

Invention on Company Time

To the Editor of Chemical Industries:

In glancing through Mr. Leo T. Parker's article "1948 Legal Decisions Hold Lessons for Chemical Makers and Sellers" appearing in your February, 1949, issue, I was rather surprised to note the discussion on page 327 of the decision of the District Court for the Southern District of New York in *E. F. Drew & Co., Inc., v. Reinhard*. Evidently Mr. Parker neglected to check this case with respect to possible appeal, for the decision of the District Court was appealed to the Court of Appeals for the Second District which reversed the District Court's decision in toto on November 3, 1948. The Court of Appeals' decision is reported among other places at 79 USPQ 252.

Mr. Parker's discussion also contains several other errors which are of sufficient importance to warrant being called to your attention. For example, in opening his discussion of the *Drew v. Reinhard* decision Mr. Parker states that the employee owns a patent unless "(2) the employee perfected the invention during the time and while being paid by the employer." This is not necessarily so, for unless the employee has agreed to assign patents on his inventions to his employer, or has been specifically hired to develop the patented invention, his employer obtains only a shop right in the patent.

Later on, in referring again to this District Court decision, Mr. Parker states "The higher court held . . ." As should have been perfectly obvious to Mr. Parker, a District Court is a court of original jurisdiction in controversies of this sort, and is not a higher or appellate court.

ROLF E. SCHNEIDER
Corning Glass Works
Corning, N. Y.

Ethyl Alcohol

To the Editor of Chemical Industries:

I noticed your article on ethyl alcohol in the February issue and can't help but tell you that this is the type of article I would like to see more of.

W. L. FAITH
Corn Products Refining Co.
Argo, Illinois

You Ain't Seen Nothin'

To the Editor of Chemical Industries:

I read your editorial on the high cost of government. The House of Commons has just been advised by the Ministry of Health and the Ministry of Food that these departments have "miscalculated" their budgets by about \$500 million. We are looking for the return any day of the 50% tax on incomes over \$500 a year.

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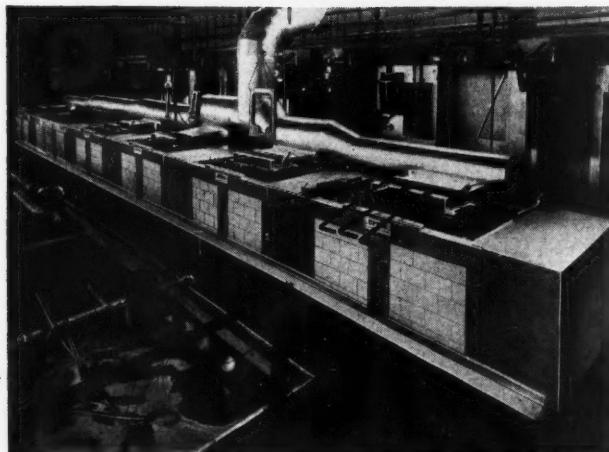


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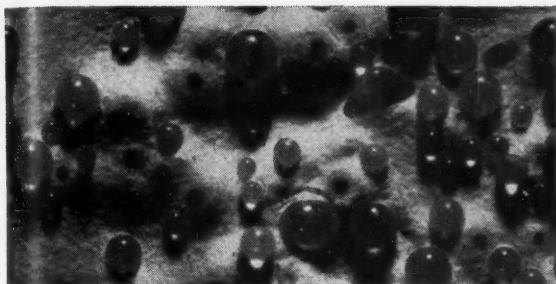
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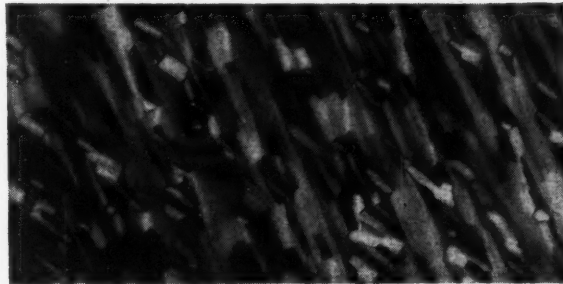


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Chemical Newsfront



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Neutralization Value (mg.KOH per g)	Max. 0.06
Water content	None
Distillation:	

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Not more than 5%	Below 118°C
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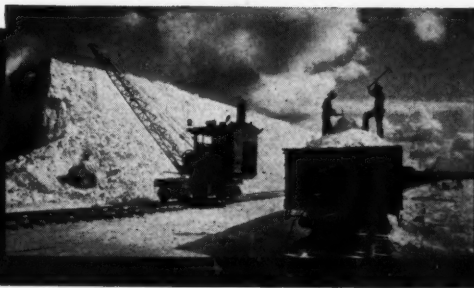
***MOLTEN SULPHUR**



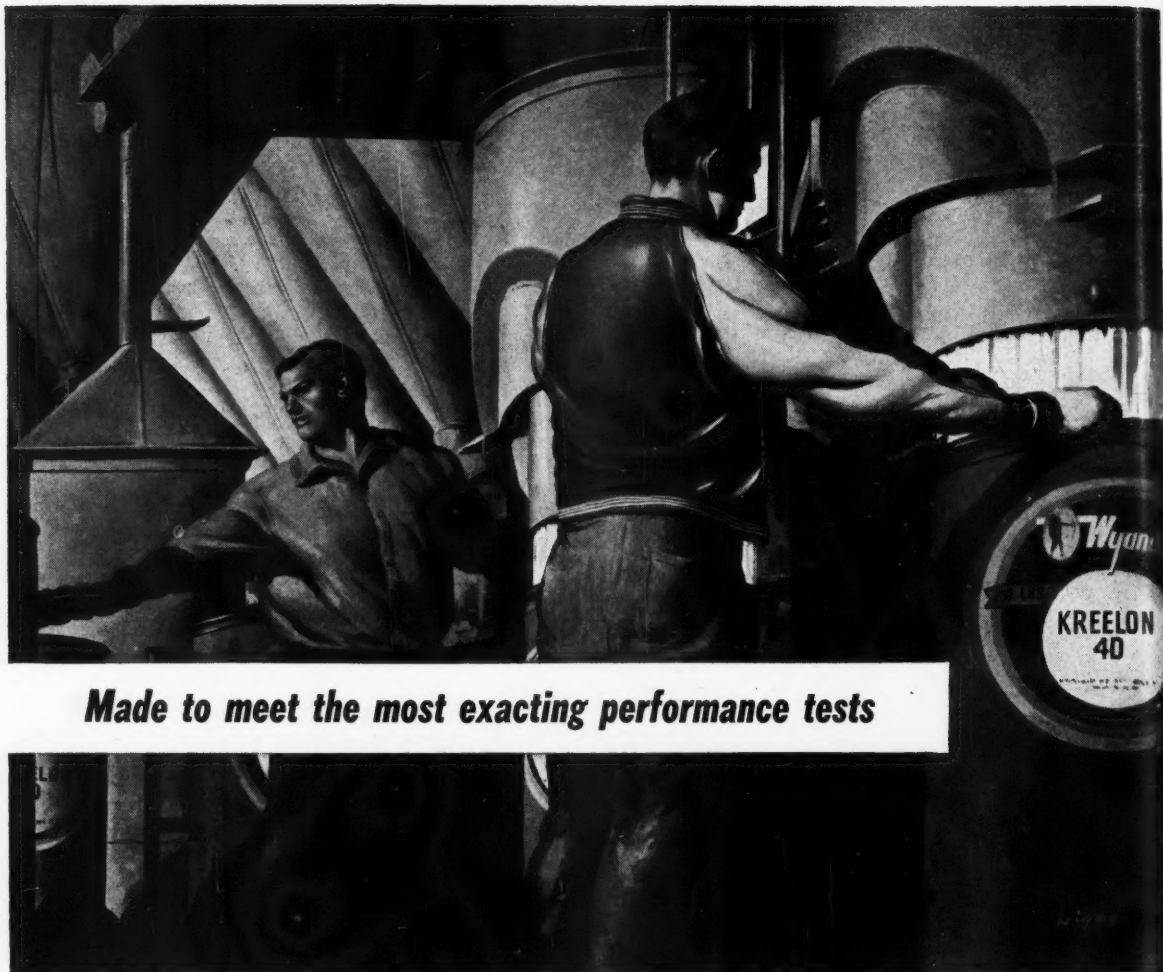
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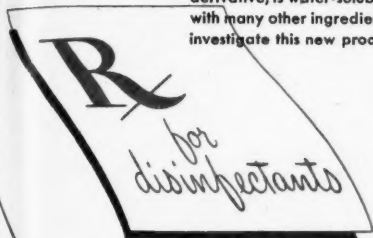
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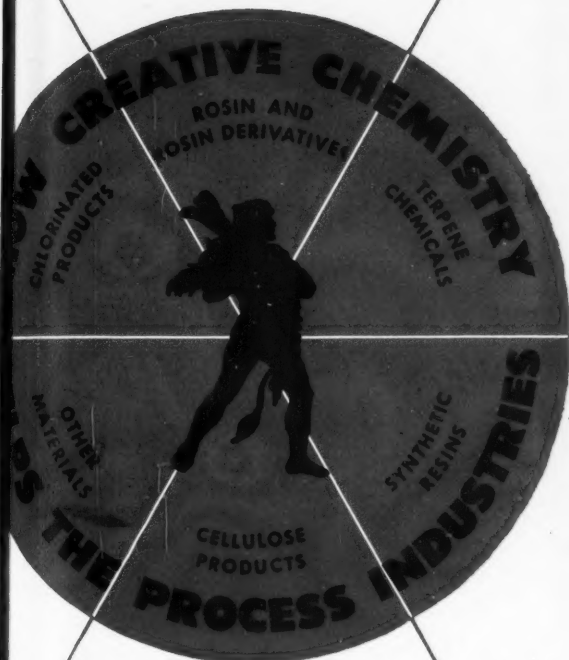
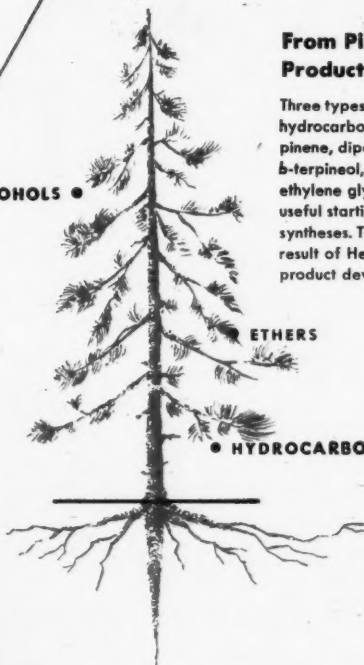
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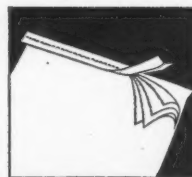
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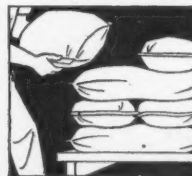
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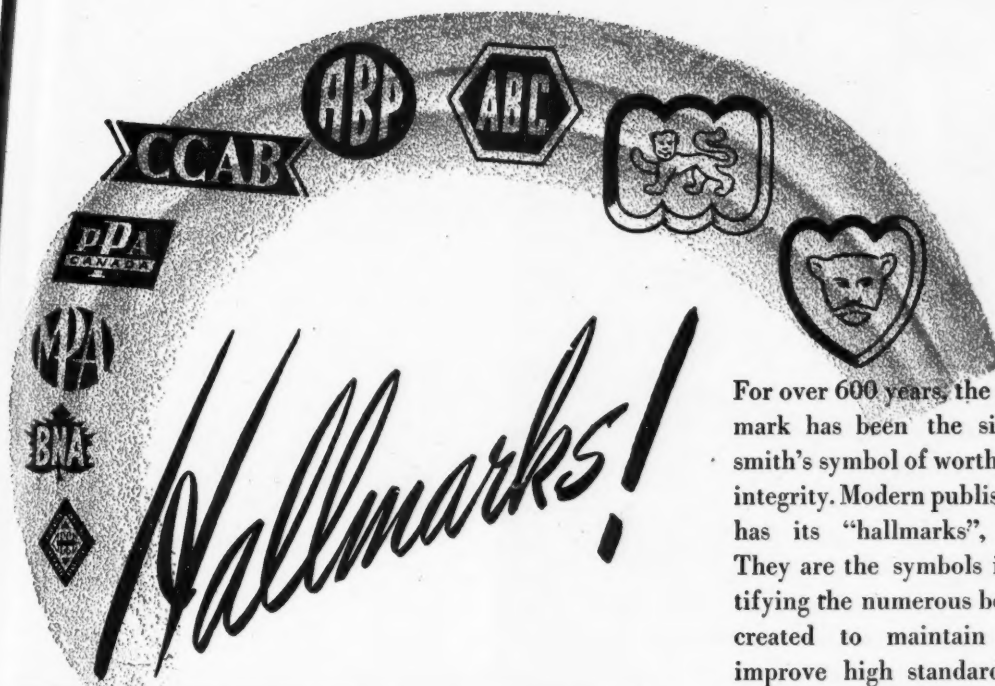
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CELANESE FORMALDEHYDE

*Low Cost Corrosion Inhibitor
for Oil Wells*



The use of Formaldehyde to inhibit corrosion in oil wells is a fast growing economical practice today. Celanese* Formaldehyde, 25% by weight, has been found to be remarkably effective in inhibiting sulfide corrosion in wells when maintained in approximately 100 PPM in the brine produced. Field trials indicate this treatment decreases corrosion nearly 100 percent. It assures longer life to rods and tubing, and therefore less shutdown time. Its great versatility, high order of chemical activity, low cost and ready availability place Formaldehyde high on the list of probables when new products and methods are studied.

To many in the chemical field, Formaldehyde means Celanese — one of the nation's largest producers, with production and shipping facilities geared to meet exacting requirements.

Special Celanese storage facilities in Corpus Christi, Texas, and New Haven, Connecticut, insure quality control and efficient service. In the Celanese Research Laboratories at Clarkwood, Texas, process improvements and new Formaldehyde products are under continual development.

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Chemical Division, Dept. 52E
180 Madison Ave., N. Y. 16

CELANESE FORMALDEHYDE in 25% concentration for oil well usage can be obtained at special low prices . . . Celanese Formaldehyde U.S.P. is also sold commercially as Formalin . . . water white solution containing 40% Formaldehyde by volume, 37% by weight . . . obtainable in both methanol inhibited and uninhibited grades.

Celanese
CHEMICALS

*Reg. U. S. Pat. Off.

ALDEHYDES • ALCOHOLS • ACIDS • SOLVENTS • GLYCOLS • KETONES • PLASTICIZERS

U.S.I. CHEMICAL NEWS

May ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1949

Progress Reported On Hydrocarbon Synthesis Plant Construction

Over 30% Completed Now, Plant Is to Begin Operations This Year

Construction of the Carthage Hydrocol, Inc. hydrocarbon synthesis plant at Brownsville, Texas, is rapidly progressing and is expected to reach a peak some time this summer, officials connected with the project announce. Co-products of the new synthesis plant—in excess of 300,000 pounds daily of water-soluble oxygenated compounds—are to be separated and refined by Stanolind Oil & Gas Company to yield commercial quantities of such important chemicals as methyl, ethyl, normal-propyl, normal-butyl, and normal-amyl alcohols; acetaldehyde, propionaldehyde, and butyraldehyde; acetone, methyl ethyl ketone, methyl propyl ketone, and methyl butyl ketone; and acetic, propionic, and butyric acids.

Important Chemicals Will Be Available

Participating in the project with Carthage Hydrocol, Inc., and Stanolind Oil & Gas Company, U. S. Industrial Chemicals, Inc., will distribute to industry or use all of the above water-soluble oxygenated co-products of the synthesis. Included in such use will be shipments of some of these synthesis chemicals by U.S.I. to certain of its other plants for producing still other compounds of extensive and diversified commercial interest.

The plant site selected has many advantages which will contribute to the success of this important pioneering development. Its location makes feasible the use of both rail and water transportation. Large quantities of sea water are available for process and utility requirements. A concentration of natural gas supplies within a 50-mile radius insures raw materials for years to come.

Over thirty per cent of the synthesis plant proper has been completed and an accelerating construction program points to initial operation late this year.

New Type of Drum Truck

A new type of drum truck is designed to make it easy for one person to handle a full drum. The truck is unique, it is claimed, in that it has three points of leverage, making it possible for a drum to be swung on each point of leverage in turn.



Pyrenone-Based Dairy Sprays Offer Safe Control of Insects

Pyrenone-Treated Cows Are Free of Stable Flies, Horse Flies, Deer Flies, Horn Flies—Give Contamination-Free Milk

Dairy cattle sprays that control stable flies, deer flies, horse flies, and horn flies—yet are non-toxic to humans and warm-blooded animals—can be formulated now, using Pyrenones as the active ingredient. The fact that no contaminants are carried over into the animals' milk from treatment with pyrenone-based sprays is good news to dairymen.

'Heat Radiation Pictures' Are Made with Phosphors

Heat and heat distribution of objects can be recorded now over a wide range of temperatures, it is reported, by two new techniques making use of sensitive phosphor compounds. In one of the new methods, scientists point out, a screen is coated with specially prepared phosphors, and a curved, metal mirror is used to focus the heat radiation of an object on the screen. Here, it is claimed, the image can be examined under ultraviolet light or can be photographed. Reports indicate that since all radiation produces a little heat, it is theoretically possible to record many things with refinements of the heat radiation technique.

Heat Distribution Is Recorded

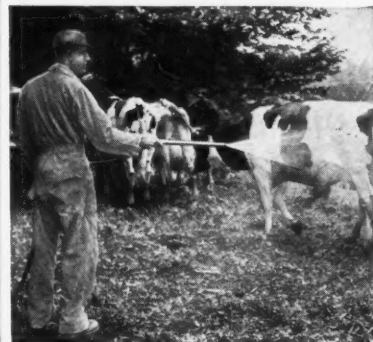
In a related technique, phosphors are said to be coated directly on an object to get a picture of its heat distribution, which can be recorded in still or motion pictures. Unusual sensitivity is obtained in thermography, scientists state, pointing out that certain phosphors show a 20 per cent change in brightness with each Centigrade degree of change in temperature. Thermography can be used over temperatures ranging from that of liquid air to four or five hundred degrees Centigrade, it is claimed.

New-Type Air Filter Uses 'Curled Casein Filament'

Commercial production of "curled casein filament" for use in a new-type air filter for automobiles has followed the discovery of an improved process for spinning fiber from casein, it is announced. The new filter, intended to supersede oil-bath air cleaners now used on many cars, is said to have a chemically treated air-cleaning element made of 80 per cent casein filament and 20 per cent wool. When the filter element becomes clogged, the filament-containing cartridge can be discarded, it is claimed, and a clean one inserted, thus eliminating the need for washing the filter.

The new milk-protein fiber, described as highly resilient, dustless, and odorless, may be colored as desired and has promise for use in many other types of product.

The United States Department of Agriculture reports that piperonyl butoxide increases the killing action and lasting effect of pyrethrum against horn flies, stable flies, tabanids, and lice on cattle; and such combinations



No contaminants are carried over into the milk of cows treated with Pyrenones. These combinations of piperonyl butoxide and pyrethrum give effective control of a wide range of insects attacking dairy cattle, yet leave no residues toxic to humans or warm-blooded animals.

have been declared unobjectionable by the Food and Drug Administration.

Emulsions Based on Pyrenones Are Safe, Highly Effective

Almost three years of testing has shown the highly specific action of pyrenone emulsions against flies. Field tests that were conducted included treatment of herds in the Northeast, the South, the semi-arid Southwest, and different portions of the Great Plains States.

In practical tests pyrenone emulsions gave protection against horn flies for 14 days

MORE

Methionine Has Sparing Action on Pantothenic Acid Requirements

Study of the sparing action of proteins on the pantothenic acid requirements of rats has recently revealed that methionine is one of the amino acids responsible for such activity. This work was recently reported at the west coast meeting of the American Chemical Society. The marked sparing action of methionine improved both growth and survival of the deficient animals.

May

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U.S.I. CHEMICAL NEWS

★

1949

New Colorimetric Test To Determine Barbiturates

A newly devised colorimetric method for determining barbiturates is said to require fewer extractions than tests currently employed. The new determination reportedly depends on the formation of a stable color complex by the reaction of the barbiturates with a cobalt salt in an anhydrous medium.

Authors of the new method mention that the usual gravimetric method of determining barbiturates is subject to considerable error. Foreign materials as well as the drug may be extracted by the solvents and weighed along with the active materials, it is said. Also, under the older methods, repeated extractions are needed to free the drug from the carrier, the scientists state.

CONTINUED

Pyrenone Dairy Sprays

during dry weather and for eight days during rainy weather. Sprays applied only to the bellies of animals gave a high degree of control of horn flies. Reports from nine different states show protection from stable flies and different species of large horse flies for a period of two to seven days.

Pyrenone sprays have been successfully used in treating barn surfaces against house flies and resting stable flies, as well as against cluster flies that rested on the treated surface.

Other Insects Are Also Controlled

Because pyrenones leave no toxic residues harmful to humans or warm-blooded animals, and because they are so versatile in their insecticidal action, they can be used effectively on sacks of feed and on walls and floors for killing grain moths and beetles. And pyrene-based formulations safely control such common insects as ticks, cattle lice, fleas, mites, bedbugs, ants, spiders, cockroaches, and other pests about the dairy, farm or ranch building.

'Portable Sound Traps' Control Unwanted Noise

New-type functional sound absorbers, claimed to have greater efficiency than many of the acoustic wall surfaces developed in the last two decades, have been studied experimentally. The new portable sound traps are said to be made up of a combination of wood and binder applied on a pair of hollow cones which are fastened together base to base. Described as one step forward in the direction of increased control over aimless noise, the new devices hold promise, by virtue of their versatility, of solving acoustical problems in many rooms used for different purposes at different times.

New Device Distinguishes Over 100,000,000 Colors

An automatic machine, so precise it can distinguish more than 100,000,000 colors, and capable of integrating continuously over all portions of the visible spectrum, has been developed recently, it is reported. The machine is said to tell immediately whether a given color will match another color and, if not, will describe the difference between them. The device reportedly is a combination of an electronically controlled ball and disc mechanism and a spectrophotometer. Together the two instruments can measure and analyze color in 2½ minutes, and can yield a numerical specification of what we see with hitherto unobtainable accuracy, it is claimed.

Glass Fibers Now Dyed

Glass fibers having no affinity as such for dyestuffs can now be dyed, it is claimed, using a recently patented process. The fibers are treated, according to the patent, with the unhardened soluble products of the reaction between formaldehyde and a complex organic compound. While the unhardened character of these products is maintained, the material is treated with a water-soluble organic dyestuff containing at least one sulfonic acid group, the patent states.

TECHNICAL DEVELOPMENTS

Further information regarding the manufacturers of these items may be obtained by writing U.S.I.

Concrete floors that simulate tile in appearance and durability are said to be produced by adding a new dry powder of high coloring power directly to the topping when laying concrete.

(No. 447)

A new treated fabric for patching metal or wood, said to repair rusted-out portions of auto panels, tin roofs, wash tubs, etc., is expected to find wide use in minor household and farm repairs.

(No. 448)

Fishermen need not dig for worms, it is claimed, if they use a mixture now on the market. Sprinkled over the ground, the "worm bait" is said to bring worms to the surface in 2 or 3 minutes.

(No. 449)

A new floor enamel for brush or spray application is described as waterproof, adhesive to wood, metal, and concrete, fast-drying, and exceptionally wear-resistant. It is said to be impervious to grease, oils, brine, alcohols, petroleum solvents, soaps, and most acids.

(No. 450)

A new durable water repellent for wool and wool-blend fabrics also makes fabrics resistant to non-oily spots and stains, and adds crease- and wear-resistance, the makers state.

(No. 451)

For use in flame-proofing, wood treating, etc., a high-melting organic, said to have the highest melting point known for a simple organic compound, is reported to be now in semi-commercial production.

(No. 452)

Laminating acetate or vinyl films to all kinds of plastic sheeting is reported possible now using a new process.

(No. 453)

A new acoustical tile is claimed to have high sound-absorbing properties and to be light in weight and non-combustible. It has excellent thermal insulation value, is unaffected by humidity, and will not warp, buckle, expand or contract, the manufacturers assert.

(No. 454)

A sealer, undercoat, and flat finish are said to be provided by one application of a new oil-based paint that can be used, the makers state, over plaster, wall board, brick, cement, concrete, wood, metal, or wall paper.

(No. 455)

Wrinkle-resistant cotton cloth that is also shrink-proof is reported produced by treating with a modified resin, said not to affect the fabric's strength. Treated fabric shows little wrinkling after three days wear, and is resistant to dust, soot, and soiling, the makers state.

(No. 456)

To protect sides and bottoms of beakers against mechanical shock and to prevent direct contact of hot beakers with a table top, a beaker holder which accommodates 1000, 1500, and 2000 ml. beakers is reported available.

(No. 457)

U.S.I. INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., NEW YORK 17, N. Y.



BRANCHES IN ALL PRINCIPAL CITIES

ALCOHOLS

Amyl Alcohol
Butanol (Normal Butyl Alcohol)
Fusel Oil—Refined

Ethanol (Ethyl Alcohol)

Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96% Absolute
*Super Pyro Anti-freeze
*Solox proprietary Solvent

*ANSOLS

Ansol M.
Ansol PR.

*Registered Trade Mark

ACETIC ESTERS

Amyl Acetate
Butyl Acetate
Ethyl Acetate

OXALIC ESTERS

Dibutyl Oxalate
Diethyl Oxalate

PHTHALIC ESTERS

Dimethyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS

*Diatoil
*Diethyl Carbonate
Ethyl Chloroformate

INTERMEDIATES

Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodiumoxalacetate

ETHERS

Ethyl Ether
Ethyl Ether Absolute—A.C.S.

FEED CONCENTRATES

Riboflavin Concentrates *Vacatone 40
*Curboy B-G *Special Liquid Curboy

ACETONE

Chemically Pure

RESINS (Synthetic and Natural)

*Araplaz—alkyds and allied materials
*Arafene—pure phenolics
*Arafchem—modified types
Ester Gums—all types
Congo Gums—raw, fused & esterified
Natural Resins—all standard grades

INSECTICIDE MATERIALS

*Pyrenone Concentrates
Pyrethrum Products
Rotenone Products

INSECTIFUGE MATERIALS

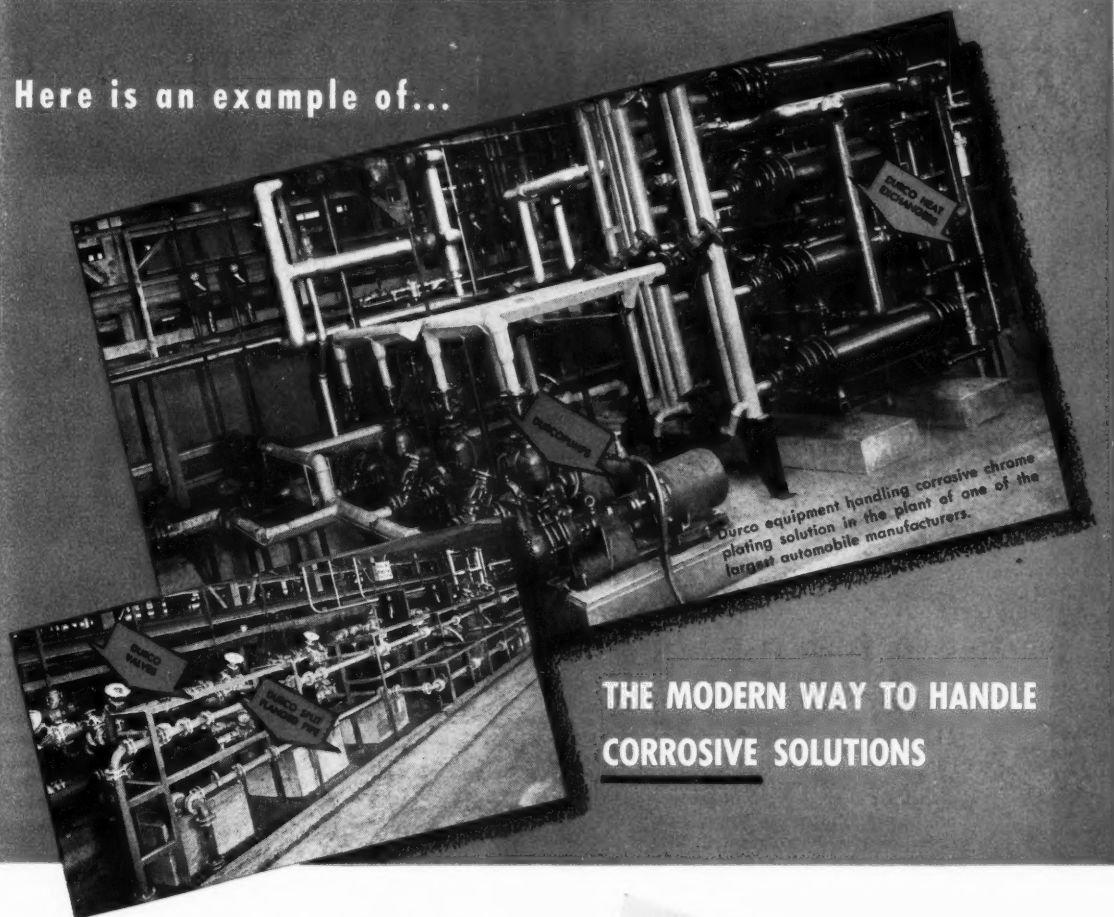
*Indalone
*Dimelone
Triple-Mix Repellents

OTHER PRODUCTS

Collodions Urethan, U.S.P.
Nitrocellulose Solutions Methylamine
Ethylene

Printed in U. S. A.

Here is an example of...



THE MODERN WAY TO HANDLE CORROSIVE SOLUTIONS

More and more Durco equipment is being used to pump, carry, heat and control chemical corrosives. Two of the many important reasons for this are:

1 LONG LIFE—All Durco equipment is constructed of special alloys for a complete range of corrosive services.

2 UNINTERRUPTED SERVICE—Durco equipment is engineered for continuous, trouble-free operation in the handling of corrosives.

The first aim of DURCO engineering is to provide design features which assure maximum life and minimum maintenance. When handling corrosives this is most important. Thirty-seven years of experience in this specialized type of design are back of Durco equipment.

For further information on Durco corrosion-resistant equipment, simply use the coupon.

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Complete Catalog	General Catalog K
Durcopumps	Bulletin 815
Durco Split Flanged Pipe	Bulletin 704
Durco Y & Angle Valves	Bulletin 815, 645
Durco Plug Valves	
(Lubricated & Non-Lubricated)	Bulletins 617 & 618
Durco Heat Exchangers	Bulletins 1610A & 1611
DURCO ALLOYS	
Alloy Selection	Bulletin 100
Duriron	Bulletin 11
Durichlor	Bulletin 59
Durimet 20	Bulletin 112
Chlorimet 2 & 3	Bulletin 114

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FOR YOUR INFORMATION



Recently completed additional manufacturing facilities further increase Monsanto's production of phosphorus, phosphoric acid and phosphates.

The world's largest electrical furnaces work 'round the clock to refine Monsanto's elemental phosphorus of better than 99.9% purity.

SOURCE OF QUALITY In Phosphoric Acid and Phosphates

Monsanto phosphoric acid and phosphates are derived from Monsanto-produced pure elemental phosphorus. From this pure phosphorus, quality-controlled Monsanto processes bring

you phosphoric acid and phosphates with uniform, high quality. These products and some of their many uses are listed below. Information and prices will be sent promptly on request.

PHOSPHORIC ACID — Soft drinks, rustproofing compounds, metal cleaning, gelatin, jelly and preserves, textiles, sugar refining, pharmaceuticals, water treatment, electro-polishing.

SODIUM PHOSPHATES

Mono Sodium — Water treatment, textiles, acid cleaning compounds.

Di Sodium — Cheese, leather, textiles, detergents, water treatment, dye, pigments.

Tri Sodium — Water softener, detergent, metal cleaner, water treatment, textiles.

Tetra Sodium Pyro — Soap, detergents, cheese, textile dyeing, bleaching and finishing, metal cleaning, oil-drilling mud, water treatment, water softener, glass, degreasing.

Tri Poly — Soap, detergents, water softener, textile dyeing, bleaching and finishing, degreasing, metal cleaning, clay refining.

Acid Sodium Pyro — Baking powder, oil-drilling mud, electroplating.

CALCIUM PHOSPHATES

Mono Calcium — Baking powder, self-rising flour, prepared flour, mineral supplement.

Di Calcium — Tooth paste, tooth powder, mineral supplement, pharmaceutical.

Calcium Pyro — Mineral supplement, pharmaceutical.

Tri Calcium — Tooth paste, tooth powder, anti-caking agent, mineral supplement, pharmaceutical.

AMMONIUM PHOSPHATES

Mono Ammonium — Fireproofing, yeast, malt, plant nutrient.

Di Ammonium — Fireproofing, yeast, plant nutrient.

POTASSIUM PHOSPHATES

Mono Potassium — Pharmaceuticals.

Di Potassium — Fermentation, nutrient solutions, pharmaceuticals.

Tri Potassium — Oil refining.

Tetra Potassium — Soap, textiles, water softener.

FERRO PHOSPHATES
MAGNESIUM PHOSPHATES
ALUMINUM PHOSPHATES
IRON PHOSPHATES
ALKYL ACID PHOSPHATES
ALKYL ALKALI PHOSPHATES
SPECIAL PHOSPHATES

ENJOY the interesting story of phosphorus in "Phosphorus... The Light Bearer." Sent upon request.

NEW PLANT FACILITIES ASSURE LARGER SUPPLIES OF SANTICIZER 141

**Versatile plasticizer aids
processing, improves quality
of vinyl products**

Recently completed manufacturing facilities now assure greatly increased supplies of Santicizer* 141, Monsanto's versatile plasticizer for polyvinyl chloride and vinyl co-polymers. It is priced to compete with other primary vinyl plasticizers.

Santicizer 141's wide compatibility and strong solvent action make possible economical reductions in processing temperatures — permit broader choice of other compounding materials. It also contributes the following desirable properties to vinyl products: low-temperature flexibility, flame resistance, light stability, low volatility, resistance to embrittlement, low toxicity.

Detailed information on Santicizer 141 — and on other members of Monsanto's family of plasticizers and resins — will be sent promptly on request.

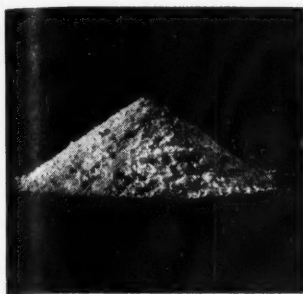


**BOOKLET
DESCRIBES
MANY
APPLICATIONS
FOR PENTA**

The industrial wood preservative

This booklet offers useful information on how Monsanto's PENTACHlorophenol can be used profitably to protect wood construction from decay and destructive insect attack.

Write for a copy of "Monsanto PENTACHlorophenol for Preserving Wood in Industrial Construction." Learn about this dependable, CLEAN, proved method of protecting your investments in wood.



BENTHAL

Improves quality of protective coatings at reasonable cost

Benthal* enables manufacturers of short oil modified resins to produce high-quality coatings economically. By replacing a portion of the dibasic acid with Benthal, a monobasic acid, it is possible to retard bodying, permit longer processing, thus reducing the acid value of alkyd resins.

Since Benthal becomes part of the resin molecule, it acts as an internal plasticizer — improves the flexibility and adhesion of dried films. Benthal is available for prompt shipment at reasonable cost. . . . For more information on its processing advantages, send for a copy of Monsanto Technical Bulletin No. O-D-503, "Benthal Applications in Alkyd Resins."

BIOLITE

New product developed for mildew control in laundries

A new Monsanto product, Biolite, has proved highly successful as a mildew preventive. It is especially useful in laundries, and is being marketed through laundry supply houses.

Biolite is a formulation of Santobrite,* Monsanto's Sodium Pentachlorophenate, Technical. This is another new application for Santobrite, which is already used extensively for slime and algae control in industrial cooling water systems, micro-organism control in pulp and paper manufacture, weed control.

AROCLOR 1248

Eliminates Fire Hazard In Die-Casting Systems

Monsanto's AROCLOR* 1248, non-flammable hydraulic fluid for metal die-casting machines, brings greater safety to the industry by eliminating the danger of fires. Economical? Of course! The cost of AROCLOR 1248 may be only half that of the fluid you now are using because of AROCLOR'S low price and low "make-up" requirement.

AROCLOR 1248 has given continuous, satisfactory service in individualized units for ten years . . . has delivered equal results in centralized systems for two years.

Look at these significant test results: AROCLOR 1248 has *no fire point*, spontaneous ignition temperature of 1,300° F. AROCLOR 1248 spray or mist requires 64% oxygen for combustion. These results establish the nonflammable and noncombustible qualities of AROCLOR 1248.

AROCLOR 1248 is noncorrosive and has such lubricating qualities that it usually is employed in die-casting systems without the addition of other lubricants. For complete details, ask for Monsanto Technical Bulletin No. P-137.

NEW TEXAS CITY STYRENE PLANT DEDICATED IN APRIL



In April, Monsanto dedicated its newly reconstructed Texas City, Texas, styrene plant.

Highlight of the dedication was a ceremony to honor the memory of 145 Monsanto employees who perished when the styrene plant was destroyed by the explosion of S.S. Grandcamp, a nitrate-laden steamer.

The new plant embodies many improvements over the old installation — is now in full-scale production.

MANY INTERMEDIATES NOW AVAILABLE FOR PROMPT SHIPMENT

Offer wide possibilities for product development and improvement

Of interest to the chemical process industries is the wide selection of Monsanto intermediates now available for immediate delivery.

Some of these chemicals may well serve as stepping stones to development of new products, or to improvement of processes presently used.

para-Aminobiphenyl • *para*-Nitrobiphenyl • *ortho*-Anisidine • *para*-Anisidine • Benzoic Acid, Technical • Benzyl Chloride • Dichloroaniline • *ortho*-Chloroaniline • *para*-Chloroaniline • *ortho*-Chlorophenol • *para*-Chlorophenol • Cyclohexylamine • Dicyclohexylamine • Dinitroaniline • Dinitrochlorobenzene, 46.5° and 48° • Monsanto Salt (*ortho*-Chloro *para*-Toluene Sodium Sulfonate) • *ortho*-Nitroaniline • *ortho*-Nitrochlorobenzene • *ortho*-Phenetidin • *para*-Phenetidin • Phenol, U.S.P. • Phenolsulfonic Acid, 65% and 70% • Sodium Benzoate, Technical • *para*-Toluenesulfonamide • *para*-Toluenesulfonchloride • Toluenesulfonic Acid

*Reg. U. S. Pat. Off.

★ ★ ★

MONSANTO CHEMICAL COMPANY, Desk E, 1703 South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.



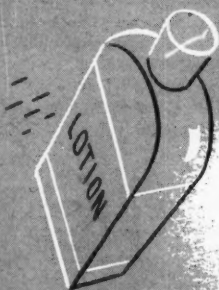
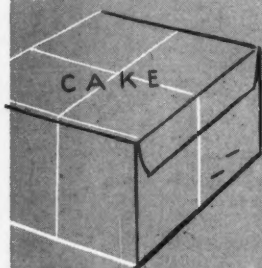
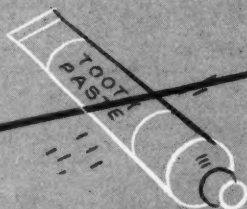
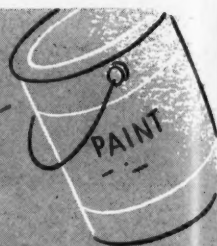
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EACH SELLS DIFFERENTLY...



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ALL
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• In bottles and boxes ... in cans and containers ... in tubes and jars ... these and many other diversified products are packaged for market in different ways. One thing, however, they all have in common. All sell better when Kelco Algin products are used to give them uniformity.

Kelco Algin products—as stabilizers, emulsifiers, suspending, thickening and water-holding agents—have proved their ability to promote better product appearance and performance in widely varying applications such as: Food and dairy products; pharmaceutical ointments and emulsions; tooth-pastes and cosmetics; latex compounds; water-thinned paints; adhesives; textile printing pastes; paperboard sizing ... and in numerous other commercial uses.

Kelco Algin products can give equally superior results in your particular application. Our Technical Service Department will gladly advise and assist you. Write or call our nearest regional office.

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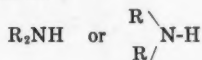


by Dr. M. R. McCorkle, Use Research and Development Laboratory, Armour and Company

Secondary Fatty Amines AND THEIR QUATERNARY SALTS

The first fatty amines to become commercially available were primary amines, having one fatty alkyl radical attached to an amino nitrogen atom. Now, two new secondary fatty amines of interest to industrial chemists have been added to the series of Armeens (trade name of the Armour amines derived from fatty acids).

These two new Armeens, Armeen 2C and Armeen 2HT, are commercial mixtures of secondary fatty amines. They have two fatty alkyl radicals attached to the amino nitrogen atom. The general formula for these secondary amines may be written as:



where R represents a high molecular weight normal-alkyl (fatty) radical.

Composition

The distribution of long chain N-alkyl radicals, and the average composition and constants of Armeen 2C and Armeen 2HT are:

N-Alkyl Radicals	Carbon Chain Length	Armeen 2C	Armeen 2HT
Octyl.....	8	8%	...
Decyl.....	10	9	...
Dodecyl.....	12	47	...
Tetradecyl.....	14	18	...
Hexadecyl.....	16	8	30%
Octadecyl.....	18	10	70
Approx. mol. comb. wt.....		435	520
Apparent secondary amine.....		80	90
Approx. melting point, °C.....		46*	68*

Volatility

Both Armeen 2C and 2HT boil at higher temperatures than corresponding primary amines. Because these products are mixtures, they distill over a wide temperature range and especially in the case of Armeen 2C, overlap on the distillation range of corresponding primary amine mixtures. At a pressure of 0.5 mm. of mercury, Armeen 2C distills over the range 160-275°C; while Armeen 2HT distills between 200-275°C at the same pressures.

Solubilities

Armeen 2C is soluble in benzene, cyclohexane, trichloromethane, carbon tetrachloride, ethyl ether, butyl acetate, methanol, 95% ethanol, isopropanol, and n-butanol. It is sparingly soluble (soluble hot) in ethyl acetate and 2-butanone; soluble hot in acetone; and sparingly soluble hot in acetonitrile. Armeen 2C is insoluble in water.

Armeen 2HT is sparingly soluble (soluble hot) in trichloromethane and carbon tetrachloride; soluble hot in benzene, cyclohexane, ethyl acetate, butyl acetate, isopropanol, n-butanol, and 2-butanone. It is sparingly soluble hot in ethyl ether, acetone, and 95% ethanol. Armeen 2HT is insoluble in methanol, acetonitrile, and water.

Reactions

The reactions of Armeens 2C and 2HT are similar to those of the primary amines. They are organic alkalis and react readily with organic or inorganic acid groups.

Oil-soluble quaternary ammonium salts may be produced from the secondary Armeens. (Available commercially as Arquad 2C and Arquad 2HT.) It is often possible to make oil-soluble salts of inorganic acids using the secondary amines as the alkali.

Suggested Uses

In lubricant additives, rust inhibitors, rubber chemicals, textile treating agents, oil-soluble quaternaries and synthetic waxes.

SECONDARY ARQUADS

The availability of the secondary fatty amines has also made possible the production of the secondary quaternary ammonium salts, which Armour has trade-named Arquad 2C and Arquad 2HT. (A series of primary amine Arquads—water soluble—has been available for some time.)

Compatibilities

The oil-soluble Arquads are compatible with both cationic and non-ionic materials. They are not compatible with anionic materials such as soaps or the common anionic synthetic detergents. Their average composition is listed on the chart below:

N-Alkyl Radicals	Carbon Chain Length	Arquad 2C	Arquad 2HT
Octyl.....	8	8%	...
Decyl.....	10	9	...
Dodecyl.....	12	47	...
Tetradecyl.....	14	18	...
Hexadecyl.....	16	8	30%
Octadecyl.....	18	10	70
Total active quaternary.....		75%	75%
Salt (NaCl).....		less than 1%	less than 1%
Isopropyl alcohol.....		about 24%	about 24%
Form at room temp.....		liquid (clouds at 20°C—gels at -25°C)	soft paste (liquid at 60°C)

The oil-soluble Arquads are stable at both high and low pH's and in the pres-

ence of most water-soluble salts. They are not precipitated by hard water.

Solubilities

These oil-soluble secondary Arquads are dispersible in water, soluble in naphtha, most hydrocarbons and a variety of other organic solvents.

Commercial Applications

Surface Activity: Oil-soluble Arquads lower the surface tension of water. (From 72 dynes at 25°C, 0.1% dispersion of Arquad 2C reduces tension to 30 dynes, 0.1% of Arquad 2HT to 37 dynes.)

Emulsifying Agents: Because of their dispersibility in water and their solubility in oils, the oil-soluble Arquads are capable of emulsifying oils into water. Such emulsions are "substantive" to cloth, wood, pigments, etc.

Dye Substantivity: Small percentages of Arquad 2C added to the dye baths result in substantivity of dyes for many types of textile materials—even hard-to-dye nylons.

Textile Softeners: These Arquads are powerful cationic softening agents for textiles. They are excellent for their non-yellowing properties.

Germicides: Arquad 2C is a powerful germicide in water dispersion.

Mold Inhibitor: Arquad 2C is also an effective mold inhibitor.

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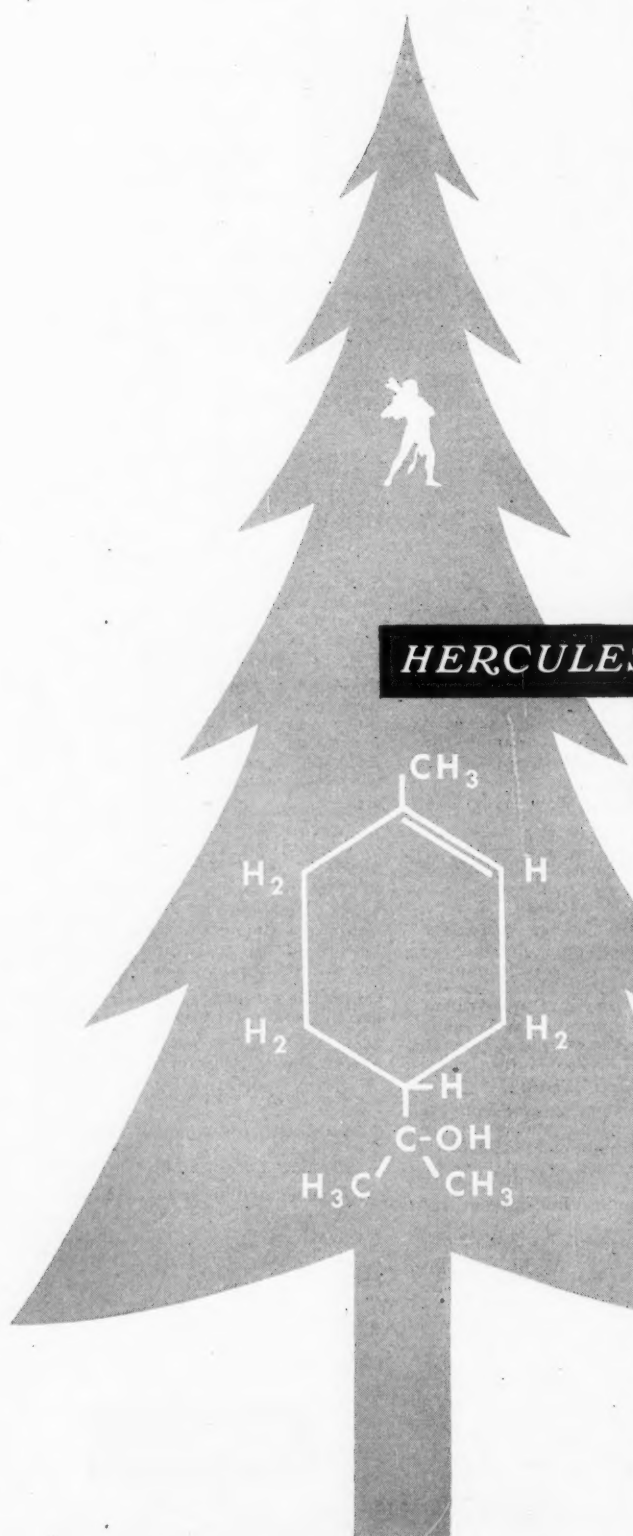
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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
May, 1949

For Your Information:

Barium Reduction Corp.'s new carbon bisulfide plant at South Charleston, W. Va., will be in full operation by June 1. It will utilize the process developed by Pure Oil Co. (and modified by BRC), in which a catalytic vapor-phase reaction of sulfur with natural gas co-produces carbon bisulfide and hydrogen sulfide. The former product is of rayon-grade purity; the latter will be used by BRC to manufacture its various sulfide products.

Chemical business barometer: General American Transportation Co.'s tank-car division is booked solid through December. Substantial orders are on hand for cars to carry sulfuric acid, phosphorus, nitrosyl chloride, propane, chlorine, metallic sodium, and tetraethyl lead.

* * CI * *

Chlorine, contrary to the general current trend, is one of the few basic chemicals still undergoing expansion. Additional chlorine-caustic capacity is going in at Freeport, Texas (Dow, 90 tons a day); and Edgewood Arsenal, Md. (Diamond Alkali, 15 tons). National Distillers Products' 80-tons-a-day chlorine-metallic sodium plant at Ashtabula, O., is scheduled for completion in April, 1950; and Ethyl Corp.'s chlorine-sodium addition at Baton Rouge will be finished this fall. Extra: Interest in possible further new capacity in the Texas Gulf Coast area is reported (but unconfirmed).

West Coast blues: There is a growing surplus of chemists and chemical engineers in that area since many who came there during the war and postwar boom are reluctant to leave. A spot check among chemical research directors throughout the country indicates, however, that research staffs generally are being maintained at last year's levels.

* * CI * *

Insecticide manufacturers, fearful of further regulation of synthetic insecticides (this issue, p. 739), will be interested in the following chemicals as they explore the possibilities of the U. S. Department of Agriculture's pyrethrum synthesis: allyl bromide or chloride (or methallyl chloride), pyruvic aldehyde, ethyl acetoacetate,

ethyl diazoacetate, and 2,5-dimethylhexadiene-2,4. From these both the acid and alcohol components of pyrethrum-like esters can be synthesized. Compounds incorporating allyl or methallyl groups exceed pyrethrins in toxicity to flies, are more stable, and cause no irritation when applied as sprays or aerosols.

Growing of crystals from molten salts under vacuum has been developed by Harshaw Chemical Co. to the point where vacuum-grown optical crystals of lithium fluoride, calcium fluoride, anthracene and other chemicals are commercially available. Vacuum growth results in greater clarity by preventing occlusion of air or reaction of the crystal or crucible materials with oxygen.

* * CI * *

Commercial Solvents Corp. will start distributing two new automotive specialties this month: a car washing compound and a cleaner for carburetors and small parts. Both will be sold under CSC's Nor'way trade name.

A synthetic bone char, named Synthad, has been developed by Baugh & Sons, Philadelphia. Made by carbonizing a mixture of organic matter and synthetic hydroxyapatite with an appropriate binder, the material is very similar to natural char except that it is harder. A full-scale comparison test in a sugar refinery showed a 23 per cent saving in make-up requirements.

* * CI * *

Here and There:

Investigations at Armour Research Foundation have resulted in an enzymatic process that cuts the time required for retting coconut fibers from several weeks down to five days. More important, it is also applicable to flax...B. F. Goodrich Chemical Co.'s vinyl resin latex is undergoing field evaluation for a number of packaging uses, particularly in the fruit industry...Limited samples of pyromellitic acid (benzene-1,2,4,5-tetracarboxylic acid) are being distributed by Oronite Chemical Co....Tennessee Eastman is manufacturing 2-ethylhexanol...Dramamine, sensational new remedy for motion sickness, is now being made commercially by G. D. Searle & Co., Chicago.

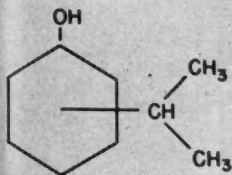
An attempt is being made by some private individuals to stir up interest in another natural soda ash mining operation near Green River, Wyoming...Procter & Gamble has been granted six patents on direct hydrogenation of heavy metal salts of organic acids to yield the corresponding alcohols. Zinc, cadmium, chromium and lead salts are mentioned; suggested pressures are 150-200 atmospheres; temperatures, 240-400 degrees C....A spokesman for Humble Oil & Refining Co. predicts that natural gas at the well head will sell for 15¢-20¢ per thousand cu. ft. within the next few years, compared with 5¢-10¢ today. The price of all hydrocarbons will rise, he believes, because of increased extraction costs; but natural gas will increase faster than the others because of expanding pipeline demands for heating purposes. This could seriously affect petrochemical development in the Southwest.

The Editors



KOPPERS NOW OFFERS

New intermediates for the chemical industry



ISOPROPYL PHENOLS

Isopropyl Phenols—long in the laboratory stage—are now being produced for the first time in commercial quantities by Koppers.

Production of the Isopropyl Phenols has been made possible by Koppers continuing research on derivatives of the coal chemicals. Many useful applications are already indicated.

Promising uses include the production of phenolic-type resins, lubricating oil additives, engine-cleaning compounds, plasticizers, rubber-processing chemicals and agricultural chemicals, and use as a solvent for wire-coating enamels.

The chemical reactivity and the physical properties of the Isopropyl Phenols are similar to those of the cresols and the lower alkylated phenols. Properties of typical samples are shown below:

	ortho- Isopropyl Phenol	meta, para- Isopropyl Phenol
Boiling Range, 5-95%	206-213°C	221-228°C
Specific Gravity, 30°C	0.987	0.983
Refractive Index, n_D^{20}	1.528	1.526
Solubility in 10% NaOH	Complete	Complete

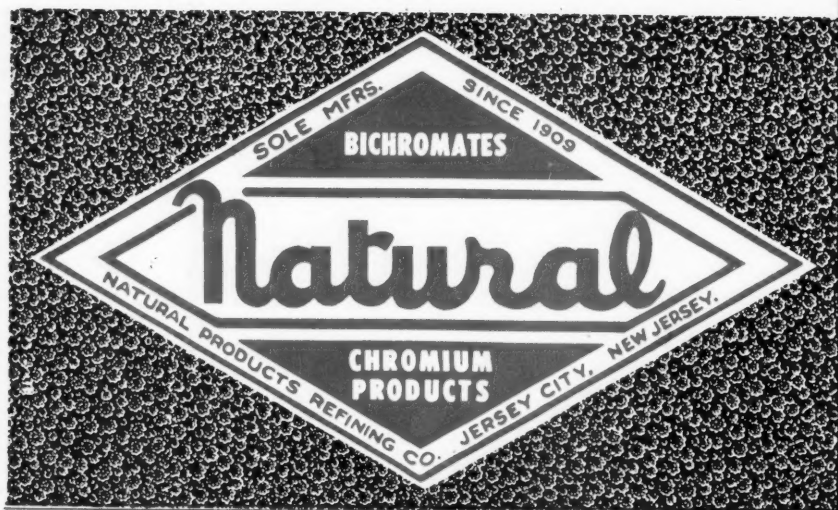
Commercial quantities of both ortho-Isopropyl Phenol and meta, para-Isopropyl Phenol are now available; Diisopropyl Phenol is available from pilot plant operations.

Samples of each grade of Koppers Isopropyl Phenols are now available to research and development chemists.

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OUR STAKE IN THE WORLD

by **ROBERT L. TAYLOR, Editor**

SOME CHEMICAL AND DRUG MANUFACTURERS interested in international trade are wondering what is going to happen to exports after the European Recovery Program bows out in 1952. Will they show a decline, or will the ECA billions have provided enough of a push to keep the European economy traveling uphill under its own steam?

To a big extent this will depend on the attitudes of businessmen and governments here and abroad over the next few years. If the political and economic climates of the world can be made favorable to trade and industry, and if businessmen can be educated in the opportunities and methods of extending their activities along international lines, world trade and industry are likely to flourish.

As a start in working toward these conditions, two distinguished committees of the International Chamber of Commerce have applied their talents over the past two years to separate phases of the problem. Both made their reports public last month.

One is entitled "A Code of Fair Treatment for Foreign Investments," and was drawn up and subscribed to by a committee of businessmen representing 32 nations.

The second, prepared by the United States Council of ICC, of which H. J. Heinz II is chairman, is called "Intelligent International Investment." Predicated on the conviction that this country's businessmen must take the initiative in stimulating a free flow of private capital in international investment, this report concerns itself with the obstacles to investment of American capital in foreign countries and how these might be overcome.

Specifically it recommends:

- A statement by the United States Government that it cannot supply foreign countries with the technology and capital which they require to develop their resources and skills, that it looks primarily to private enterprise to provide these things.
- Creation of a business "climate" in other countries which will be attractive to private investment.

- Joint government-business exploration of various government inducements to private foreign investment.

- Long-term government contracts for the purchase of strategic raw materials.

- Elimination of burdensome taxation on foreign investments.

- Statutory registration of agreements between United States and foreign business interests for the exchange of methods and processes under immunity from punitive provisions of the antitrust laws.

- Government loans for closely circumscribed types of projects under private execution in order to increase opportunities for private investment in foreign countries.

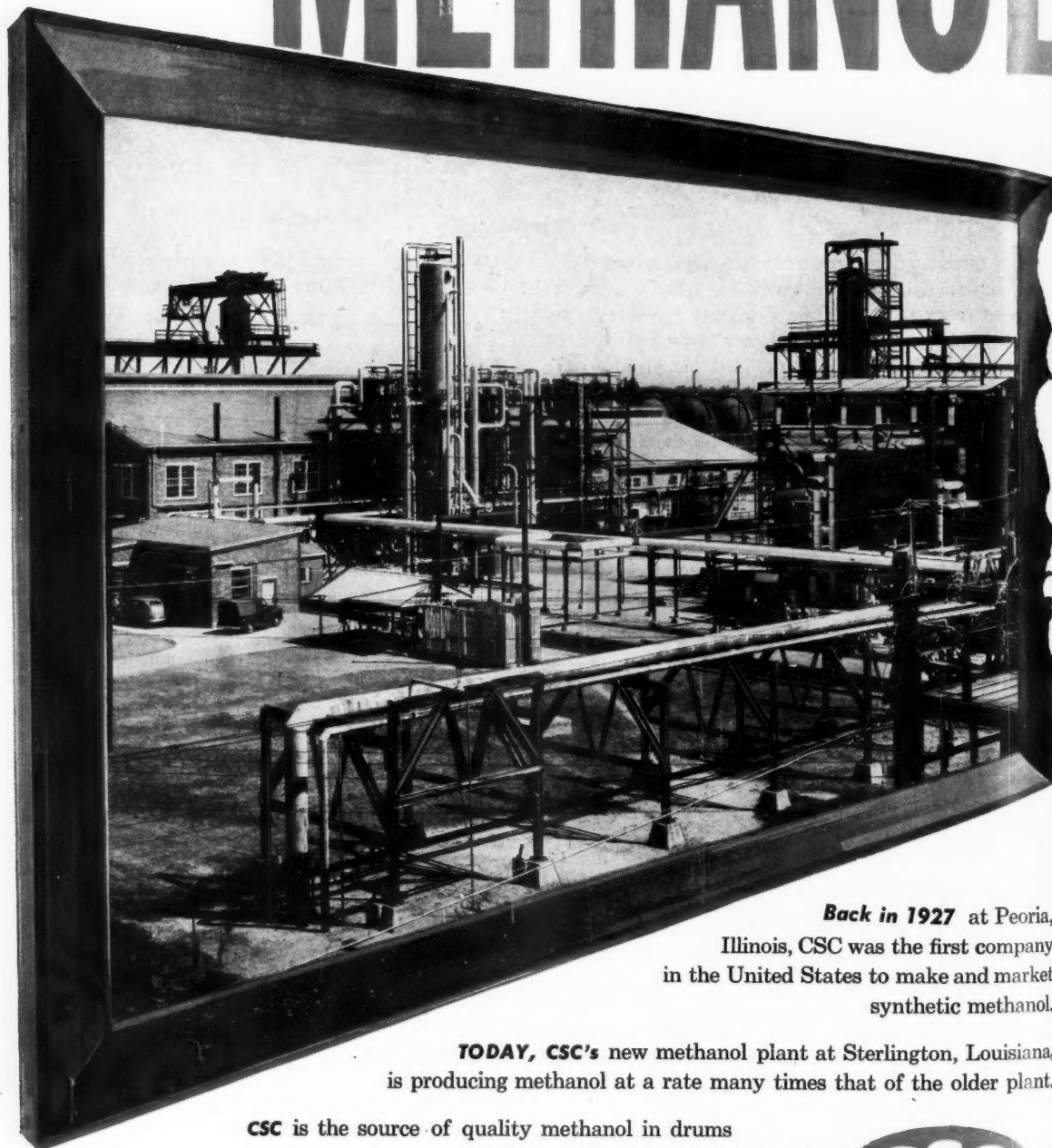
- Technical missions to foreign countries under government auspices to advise on carefully selected development projects.

This is a program, it seems to us, that chemical industry should support and take active part in. Yet we were surprised to see the name of only one chemical company representative among the 98 members of the Board of Trustees of the United States Council.

Certainly the American chemical industry has long outgrown its swaddling clothes. It is able to take care of itself away from home, as is being amply demonstrated by several of the major producers who have extended their operations to many corners of the globe.

With its acknowledged world leadership in methods and technology the chemical industry is now in a position to extend its activities abroad and at the same time play a major role in a program of world economic development conducted on a private initiative basis. Such a program is consistent with all of the principles on which the industry has based its phenomenal success and growth in this country. Any aid it can give in extending these same principles throughout the world will not only be laying the groundwork for a healthy domestic and world economy after ECA, but it also may be one of the important keys to achievement of that greatest of the goals of our time—peace with freedom.

METHANOL



Back in 1927 at Peoria, Illinois, CSC was the first company in the United States to make and market synthetic methanol.

TODAY, CSC's new methanol plant at Sterlington, Louisiana, is producing methanol at a rate many times that of the older plant.

CSC is the source of quality methanol in drums or tank cars. Your inquiry is invited.



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What's new



Ewing Galloway

CHEMICAL SALESMAN: From desk jockey to bush beater.

REBIRTH OF A SALESMAN

With a buyers' market for chemicals in full bloom, companies are dusting off old techniques, spawning new tricks to move products.

THE SALESMAN IS AGAIN fighting for the luncheon tab . . . and meaning it. The present buyers' market for chemicals, already nine months old (*CI*, Aug. 1948, p. 209), finds him no longer enscathed as a desk jockey allocating available supplies, but on the road calling on prospects. With the return of the salesman to his traditional role, the black market is only a bad memory of another period. Selling is again a major problem of chemical companies.

There are indications that even the fastest-talking seller cannot move all that our tremendously expanded capacity can put on the market: Although production of inorganic heavy chemicals has declined only slightly, such tonnage organics as acetic anhydride, phthalic anhydride, phenol and methanol have already added a downward hook to production charts. Last year's output of the synthetic organic chemical industry was some 12 billion pounds—up 50 per cent in less than three years—and this filled the seemingly bottomless pit into which production has been flowing. Coincidental sharp declines in production of cellulose acetate, phenol-formaldehyde plastics and practically all types of coatings lessened

demands on this reservoir and forced cutbacks.

Pack Rat Passes

Now that the consumer can count on delivery dates, he is extremely happy to dip into his inventory and, in effect, let the seller bear a larger part of his working capital load. Previously, in pack rat fashion, he had stored everything he could obtain " . . . just in case . . ." his allocation might be curtailed the next month. Consumption of these excessive warehouse stocks at a time of reduced demand has further cut production. The true demand for chemicals can be evaluated as soon as reserves are depleted to a working level, for then production statistics will represent actual consumption—not consumption minus inventory.

Not only has the producer been forced to carry "inventory" for his customers, but he has been faced with sporadic buying as consumers, anticipating price cuts, held off purchases of normal quantities. To combat this practice and keep an even flow of orders through the plant, one chemical producer has insured his customers against price cuts over a stated period: If there is a decrease in price

within the given time, the customer's inventory is evaluated and he is refunded the difference between the original price and the new price. Thus, one of the major causes of hand-to-mouth purchasing is eliminated.

First Line of Defense

The heavy weapon of the chemical companies' fight for the sales dollar, however, is still the salesman. He has received orders to dust off the old briefcase, get a new set of time tables, and start beating the bush both for new customers and oldtimers who may have been lost during the days of priorities. Personal contact is the surest way to bring these fellows into the fold.

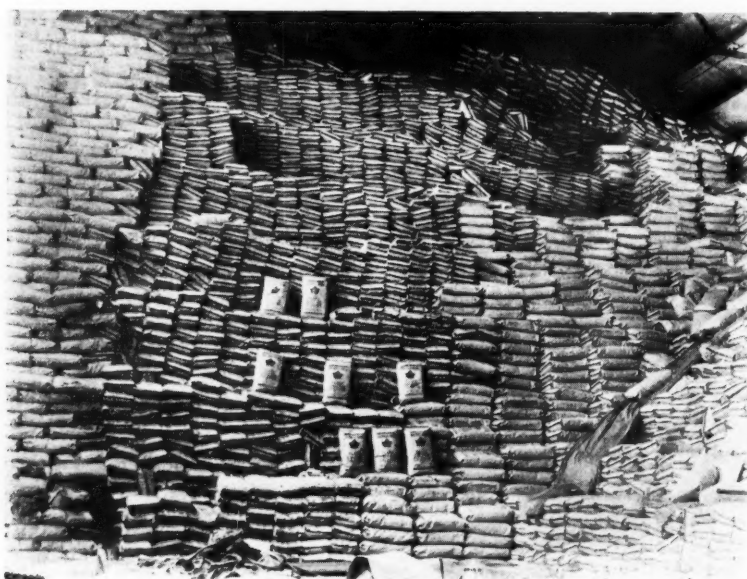
Despite this return to basic selling, producers are not expanding sales staffs at an accelerated rate, for, as an official of one prominent producer comments, "You don't make a good salesman overnight." He does note, however, that his active sales department has been very appreciably expanded, although the total number of employees has been only slightly increased. This extra personnel has been made available by returning to their regular selling jobs those who formerly handled paper work connected with allocations and placated irate consumers hoping for "just another drum."

Field Artillery

Close support is being given the salesman in the field by increased emphasis on technical service to aid the customer in making the "right" decision. This is a tried-and-true method of winning a fair share of the available business, but some chemical producers are adding new twists.

Several plastics producers are now carrying on extensive customer research by canvassing not the fabricator to whom molding compounds are sold, but the ultimate consumer whose needs and desires are the true market. They find which of their products are suitable for the desired objects and pass all this information on to the fabricator. This insures him of salable products and them of repeat orders. Costly? Yes, but cheaper than an idle plant.

Somewhat similar to this program is the work of the sales research department of a chemical producer. While this group was formed some time ago, the present situation has brought it into its own. This department's job is to scout various in-



BUYERS' MARKET: Mountains to move.

dustries for specific problems that furrow the brow of the worker, production manager, design engineer or executive. Those that appear most likely to be solved by use of the company's products become development projects. When the answer is found, the company goes to its customers and not only points out the sure bet they have been missing but tells them how to make the products to sell the market it has uncovered for them. Although competitors also stand to benefit from this exploratory work, the company providing the solution usually makes the most sales.

All companies, regardless of whether they have such elaborate programs as this, are increasing the tempo of their application research. Management, more anxious to develop new uses for chemicals pouring out of plants representing huge capital investment than to embark on projects that won't pay off for years, is looking favorably on research budgets weighted in favor of the short-term projects. New markets are being sought out as avidly as new customers.

Over There

One major organic chemical producer's increase in export sales within the past few months has helped to take the edge off of disappointing domestic demand. This business, however, didn't just roll in as the word got around that chemicals were available; the ground work was laid when materials were tight. A fixed percentage of production was allocated to the export market during the hard times of the exporter; that percentage has gradually increased and now represents a welcome increase in sales outlets.

All producers aren't in this advantageous position, but they are turning to export markets to sell both organics and inorganics. Increasing quantities of alkali (about 5 per cent) and sulfur are moving into such channels. One major sulfur producer shipped more sulfur in March than in any month in its history; the foreign market made this possible.

But dollar restrictions and competition from foreign countries limit the amount of relief export sales can provide. Italy has become a very large exporter of dyestuffs, and England will be a major factor in the world market for aliphatics as well as aromatics when its four huge petrochemical plants are completed. The first exports are coming out of Germany (*CI*, Aug. 1948, p. 212), and more are on the way. In this picture, American companies stand the best chance of consolidating markets for such products as alkalis, which require very large capital investment to build the large plants necessary for low-cost production. There is, however, the possibility that national pride will protect uneconomical units with high tariffs to keep out foreign competition.

Over Here

Not only have executives looked to overseas markets to absorb excess production, but each has examined his own organization's ability to use new products in materials it is now producing. Previously management has been chary of approving projects that would require as raw materials large quantities of chemicals for which there was a ready and profitable market. Changes in conditions have caused changes in thinking.

At first, slackened production will mitigate against such developments as management feels its way in the new environment. As the situation stabilizes, however, the trend to exploit the potential of existing raw materials will provide a steady flow of new products.

The Price Front

When all other blandishments fail to provoke a sufficient volume of sales, producers have to resort to price cuts. The break in ethanol was merely the most spectacular of reductions that have also included such tonnage organic chemicals as formaldehyde, acetic acid, acetone, and isopropanol. More reductions are in the cards as producers have to sacrifice high unit profits to meet intensified competition.

Price cuts always bring out the blue pencil and a call for cost reduction. Some economies have been made possible by the mere fact of ample supply, for specific shipping and delivery dates can now be counted upon. This makes possible better scheduling of production. Moreover, now that the pressure to get maximum production out of existing equipment has eased, proper maintenance can again be instituted. In many cases, this has meant a complete overhauling of plants that will result in lower operating costs. Some of the current reduction in output is undoubtedly attributable to plants down or operating at rates curtailed for such overdue renovating.

Although not usually considered a direct item in the price of chemicals, the cost of transporting products to the consumer is not being overlooked, especially in light of the rather drastic freight rate increases over the past few years. Better materials handling is one means of reducing this cost, but most attention has been centered on alternate shipping methods. One company is shipping formaldehyde in a converted LST from Texas to a New England point, and then distributing it to customers by tank truck. Another is hauling acetone in tankers from the Gulf Coast to the East (*CI*, Oct. 1948, pp. 585-586).

Tank trucks are also being considered by chlorine producers. In spite of the danger of a large multiple-plaintiff lawsuit in case of an accident in a populated area, the large potential savings are winning this development the green light.

Chlorine manufacturers are trying still another move. An application has been made for a reclassification for chlorine shipments in rail transport, which, if successful, will reduce the cost of freight about 40% (*CI*, April 1949, p. 551).

Producers are taking every advantage of savings made possible by barge shipment through the Inland Waterways and

the Intercoastal Canal. A major producer of organic chemicals in Texas is shipping every pound of a large number of his products in this fashion to a re-shipment terminal on the Ohio River.

Regrouping Forces

These steps to cut costs so that prices can be lowered seem to lack the glamor associated with the prodigious technical achievements and production records that have characterized the chemical industry of the past few years. However, this is normal business in a healthy economy. The ball has been passed to the salesman, but he will be ably supported by the same technical teams that built the industry.

Regrouping these forces is solving the chemical industry's immediate problem—consolidation of the market for its products.

DDT BUGABOO

Exaggerated reports of DDT hazards, new recommendations for dairy and beef cattle insecticides spell double trouble for industry.

BANNER HEADLINES last month told the public that in DDT it had taken a viper to its bosom. This month insecticide manufacturers are striving (as they will be for many months to come) to correct many misconceptions that have arisen out of the sensational treatment given reports of DDT poisoning.

Added to that difficult task will be adjustments to comply with USDA recommendations advising against the use of DDT on dairy animals and on forage or other feeds for dairy animals or animals being finished for slaughter. Revamping formulas with less toxic insecticides for pest control around dairy barns and revision of labels on present stocks of DDT insecticides are filling the working hours of manufacturers, as in their off-hours they wonder when the next blow will fall.

"DDT and You"

Cause of the DDT scare was a series of articles entitled "DDT and You" that appeared under the byline of the *New York Post-Home News*' crusading columnist, Albert Deutsch. A great portion of his daily column was based on published reports of a New York physician and pharmacologist, Dr. Morton S. Bis- kind, to the effect that a number of cases of "virus x" were actually DDT poisoning, and that "x disease" in cattle closely resembled DDT poisoning. In a joint statement, the USDA, the Federal Security Agency, Departments of the Army and the Navy, and the Pan-American Sanitary Bureau said reports that DDT was responsible for these diseases were

"without foundation" and pointed to the existence of these diseases before the use of DDT as an insecticide.

After the first few articles had appeared, a box warning against undue alarm was run alongside the "exposé," but more people heeded the skull and crossbones on the front pages of several issues than this conciliatory note. The flood of inquiries that reached the Food and Drug Administration and other agencies was ample evidence of the concern shown by users of this and other insecticides.

Saner Approach

That DDT and other of the relatively new synthetic insecticides are poisons is not news to anyone, and the problem of utilizing their benefits without harm to people was considered in a series of papers delivered at the recent San Francisco meeting of the American Chemical Society. Here there was a division of opinion ranging from the demand for immediate public controls to the view that they can continue to be used with safety. In general, it is conceded that the benefits of these materials far exceed hazards in their use, but more rigid controls over their manufacture and distribution would not surprise anyone. However, the industry wants these to be based on fact and not on mass-hysteria.

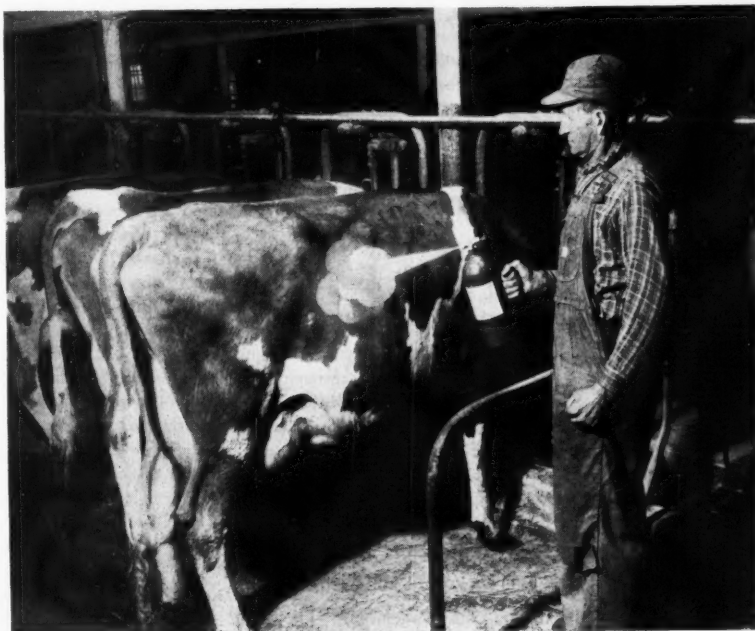
The USDA has fully considered the toxicity of DDT, as it has all other insecticides, in making recommendations for use, and states that there is no evidence of human sickness due to DDT

used in accordance with such recommendations. Because continued tests reveal that DDT residues can sometimes be detected in milk following direct application of the insecticide to milk cows to control livestock pests or its use for fly control in dairy barns, this agency has warned against its further use for this purpose—a necessary precaution to insure the wholesomeness of this food so important in the diet of infants and children. Since there is also evidence that DDT residues are stored in animal fat and are present in meat of animals treated less than 30 days before slaughtering, the department has also warned against feeding DDT-treated forage or other feed to such animals for this period prior to slaughtering, or to dairy cows at all.

Methoxychlor and Pyrethrum

Methoxychlor, the analog of DDT that is among the least dangerous of the new synthetics, has been recommended in place of DDT to control major pests on dairy cattle and in dairy establishments. (Other chlorinated insecticides not winning approval are benzene hexachloride, chlordane, toxaphene and TDE—also known as DDD.) In the latter application—as a residual spray on environmental surfaces—limited tests with methoxychlor have given promising but somewhat erratic results. It is recommended for such use.

Combinations of pyrethrum and the synergist piperonyl butoxide, which are among the most innocuous insecticidal materials, have also been given the nod of approval for use on dairy animals.



DAIRY INSECTICIDES: Some changes made.

Pyrethrum, a natural material that is imported, is expensive and has been in tight supply. Synergists to increase its effectiveness will make a given amount go farther and will reduce the cost of the finished insecticide. Although these insecticides have not shown much promise in preliminary tests as residual sprays on building surfaces and the like, they can be used as space sprays for fly control, as can the organic thiocyanates.

Manufacturers have already started to market new sprays and aerosols for dairy cattle use with formulations revised according to the new directives. They are also revising labels on DDT products bearing statements recommending their use for the purposes no longer considered safe. In some cases, claims must be deleted, while for other products, inclusion of a leaflet or the like amending the old directions is sufficient. It is no easy task since many questions can be answered only on an individual basis.

Future Trouble?

Of greater concern to the industry than these necessary and proper changes is the possible effect on the buying public of unfounded exaggerations about the dangers of DDT and other insecticides as well. It is generally felt that the public will be reassured by the responsible statements of government agencies charged with regulating such products.

However, a sign of future marketing difficulties may be seen in a few advertisements for insecticides that claim "contains no DDT." To protect themselves against any growth of this movement or impetuous action brought on by pressure, manufacturers are busily experimenting with methoxychlor, pyrethrum, piperonyl butoxide and other materials for household and general insecticides as well as the new dairy formulations.

TRILEMMA

Many factors govern process engineer's choice among distillation, extraction, and extractive distillation.

THE PROCESS engineer is continually faced with the problem of deciding quickly and correctly on the best method of separating new mixtures. In a paper at the recent ACS meeting in San Francisco, Mott Souders of Shell Development Co. has done a real service for the process engineer by carefully listing the factors which must be considered in such decisions.

In his discussion Souders considers only three methods of separation, but three highly important ones: distillation, extractive distillation, and extraction. In

the range of boiling points where distillation may be conducted at reasonable pressures, the three processes become competitive and the decision among them must be based largely on the relative selectivity.

Capital Costs

In comparing the three at equal selectivity, Souders points out the relative magnitude of the factors which enter the capital costs of each process. In extractive distillation and extraction, lower plate efficiency results in numbers of plates $1\frac{1}{2}$ and 3 times as great, respectively, as the requirements of simple distillation. In addition, due to the lower throughput rate and the large volume of high-molecular-weight solvent, extraction equipment must be approximately 4 times, and extractive distillation equipment 2 times the diameter of distillation equipment. Considering the increase in steel from these factors alone, extraction capital costs will run essentially 12 times, and extractive distillation 3 times, distillation costs.

Extraction and extractive distillation in general can compete with distillation only in the range where the selectivity of distillation is very low; and even here the selectivity of the extraction and extractive distillation must be high. From the curves presented by Souders showing the selectivities necessary to obtain equal costs, if distillation has a relative volatility of $1\frac{1}{2}$, extraction in order to compete must have a "relative volatility" of 6, and extractive distillation a relative volatility of approximately 4. At higher values of relative volatility the spread is even greater: 70 to 80 is required in extraction to compete with distillation at a relative volatility of 3.

Other Factors

Other factors besides the basic costs of the separation unit itself enter the capital cost picture, although decisions can often be made on the basis of these costs alone.

The heat-transfer surface is important, and any requirements for special materials or special alloys may considerably alter the total costs. Operating costs, such as heat requirements, solvent make-up, maintenance and service, and—particularly if the operation is to be large scale—the feasibility of automatic control, influence the decision.

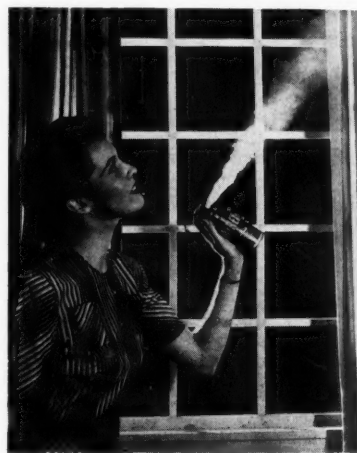
But beyond all of these are factors which are often neglected: the development cost, the reservoir of prior knowledge, and the urgency of the project. If the project is urgent, development costs mount, and it is often better to rely on prior knowledge of a first process than to lose production while exploring a second one.

BIG BOMBER

General Chemical enters household specialties field with low-pressure aerosol line.

JUST HOW BIG is this low-pressure aerosol business going to be? That's the question the chemical industry has been asking since enterprising specialties companies started to jet propel their products—and sales.

The answer seems to be "plenty big," for General Chemical Division of Allied Chemical and Dye Corp., a king-size producer of industrial chemicals, has moved in with a new product in a new



AIREX MOTHICIDE: Big fellow moves in.

container. And this is just the forerunner of a whole line of such materials to be similarly packaged.

Although the consumer field is largely foreign to the company (previous experience limited to a small line of home and garden insecticides sold under the trademark Mechling), the move is logical. General Chemical is a large manufacturer of basic insecticidal and agricultural chemicals and has only recently introduced its new aerosol propellents, Genetrons, an outgrowth of its fluorine research. The new aerosols will expedite the movement of these materials to the consumer, and the company can eliminate the middleman "canner's" cut in this burgeoning new field.

Moths First

First pests to be targets of the Airex line—as the new aerosols will be known—will be moths, open season on which has just been declared by housewives. The Airex Moth Killer contains Genetron as the dispersing gas and a new mothicide developed by the company and dubbed Benz-o-gen (benzhydryl-*n*-butyl ether).

as well as the standard ingredients—DDT, pyrethrins, piperonyl butoxide and aromatic distillates. Quick knockdown, instant kill of larvae and lasting residual effect are claimed for the product. Fair-traded at \$1.98 for the 12-ounce dispenser, the product will be distributed nationally.

Scheduled to be introduced by the end of this month will be the Airex Insect Killer, an all-purpose insecticidal aerosol containing DDT and pyrethrum. This will retail at \$1.69 a can. Sometime later General Chemical will add its air freshener to the line, but plans for other products have not been decided upon yet. Possible avenues of expansion now being exploited by other companies (*CI, April 1949, pp. 562-563*) include plastic sprays, touchup paints, wax polishes, greenhouse sprays and pharmaceutical and cosmetic products such as under-arm deodorants, sun-tan lotions, and germicides.

Selling Points

In the large-scale newspaper and radio promotion campaign to launch the moth-killer, General Chemical has some new things to talk about. It claims that Genetron, developed for aerosol use, provides 20 per cent more vapor per unit weight than other dispersants (mixtures of methylene chloride or Freon 11 and Freon 12 have been commonly used). In addition, it is said to be more soluble and to provide better dispersion of particles, and hence more effective action. It is non-flammable, non-corrosive, and stainless.

The new container, an exclusive design of General Chemical, is a far cry from containers that won the first low-pressure aerosols the name "beer can bombs." A polished aluminum seamless dispenser that weighs but 1½ ounces empty has replaced the seamed tin can. In addition to its lightness, it is but 2½ inches in diameter so that it fits snugly into a woman's hand. Other features are a finger-tip push-button release, a ball-type valve to prevent leakage, a one-way hood to eliminate "back-firing," a transparent plastic dome to protect the button until used, and a deep-draw feed tube to exhaust the container's contents.

Realizing that dealing directly with consumers is a business apart from selling to industry, General Chemical has set up a separate department to handle the new aerosols. Although all the products will be packaged in the same type container and the labels will be similar in design, each label will have a distinctive color. The aim is to fill a kitchen shelf with an attractive assortment of household specialties. From the new ideas the company has brought to the aerosol field, it looks like it has a good chance of doing just that.

HIGH-TEMP SULFIDES

Rare-earth sulfides show promise as high-temperature refractories.

THE RARE earths, not so rare as they once were, have in the last few years been the cynosure of scientific eyes.

A group of chemists at University of California's Department of Chemistry and Radiation Laboratory have been looking at the refractory rare-earth sulfides, and they reported their promising findings to the recent national meeting of the American Chemical Society. Involved in the project were L. A. Bromley, who presented the paper, Leo Brewer, P. W. Gilles, N. L. Lofgren, and the late E. D. Eastman.

The sulfides of cerium and thorium are especially interesting, particularly in applications where an oxygen-containing material (such as magnesia) cannot be used. Among the more promising is cerium monosulfide, CeS , a brassy-yellow substance with mechanical properties like those of cast iron. Its melting point is high (about 2,500° C.), it resists spalling, and it can be fabricated with ease. Small crucibles of the pure material have been heated at a rate of 1,000° C. per minute without fracture. Shaped objects can be readily formed by the ordinary techniques of powder metallurgy.

Sensitive to Oxygen

The compound is resistant to molten alkali, alkaline-earth elements, cerium, iron, titanium, and several other elements. It is not attacked by air, steam, or water at temperatures below 200° C., but it is readily decomposed by aqueous acids. It is also attacked by oxygen at high temperatures and must be used in an inert atmosphere or vacuum.

Cerium monosulfide is prepared by direct combination of the normal sulfide, Ce_2S_3 , with cerium hydride, CeH_3 . The normal sulfide is first prepared by reaction of the oxide, CeO_2 , with hydrogen sulfide at 1200-1400° C. in an inductively heated graphite chamber. CeH_3 is prepared by allowing cerium metal to absorb hydrogen at approximately room temperature, although it must subsequently be handled in an inert atmosphere. Powdered Ce_2S_3 and CeH_3 in the quantities required for complete reaction are heated to 2200° C. under vacuum in a molybdenum crucible to produce solid chunks of CeS .

Thorium Too

Other higher sulfides of cerium, and the corresponding sulfides of thorium, particularly ThS , have refractory properties similar to those of cerium monosulfide. The thorium sulfides are prepared



L. A. BROMLEY: Rare earths, rare properties.

by procedures analogous to those used for the corresponding cerium compounds. The various sulfides differ appreciably in some properties, such as electrical conductivity and spalling resistance, affording some latitude of choice for particular applications.

ELECTRO-PLASTICS

Plastics and elastomers with conductivities approaching that of metallic mercury are now in industry's bag of tricks.

A TOTALLY new class of materials is emerging from the cooperative efforts of the Naval Ordnance Laboratory and the Markite Co.: plastics with conductivities ranging from that of distilled water to values approaching that of metallic mercury. Thermosetting, thermoplastic and elastomeric forms can be prepared. Appearances will vary from dark, opaque, semi-metallic-looking materials to slightly colored but completely transparent.

The Markites, as they are called, are not the familiar dispersions of conductive particles in standard plastics and elastomers; high conductivity is not secured at the price of poor mechanical properties or high density. In fact, the electrical and thermal conductivities of several of the Markites are the only properties which vary appreciably from those of ordinary plastics.

High present costs—several dollars per pound—will tend to limit use of the Markites to places where other materials are not suitable or where their unique combinations of properties make possible great savings in assembly costs. This means the materials will be used principally for specialty electrical applications.

Métals can be electroplated on Mar-

kites and integral bonds can be formed by simultaneously comolding with certain of the ordinary insulator plastics. Thus, a potential use is in the molding of three-dimensional circuit elements which will have electrical characteristics that are extremely difficult to obtain economically on a production line basis.

Since the molding operations are not conventional and special precautions must be observed, the Markite Co. is at present not supplying molding powders, but is furnishing parts molded directly to the user's specifications.

SUPER GAS CLEANERS

Fluo-solids and Venturi principles mark new methods for removing fine mists and dusts from gases.

EXTREMELY FINE mists and dusts, especially those stabilized by an electric charge, are elusive forms of matter. With the exception of the relatively expensive electrostatic precipitator, and very recently several sonic devices, they have resisted capture by almost every type of trap devised by engineers. Now, with the heat on in industrial communities to curb dusts and mists emanating from local smokestacks, chemical engineers are seeking a greater variety of tools to choose from for some of the more difficult jobs.

Two such tools have recently made their professional bows. One, an apparatus utilizing a fluidized bed of a porous material such as alumina or silica gel, is still in the development stage. The other, the so-called Venturi scrubber, developed by the Pease, Anthony Equipment Co., Newtonville, Mass., has already been in commercial use for a little over a year in such applications as the recovery of sodium compounds from pulp mill stack gases and the recovery of iron oxide dust from open-hearth furnace gases.

Increase the Collisions

The idea of applying fluo-solids techniques to the cleaning of gases was conceived by Professors Herman P. Meissner and Harold S. Mickley of the chemical engineering department of Massachusetts Institute of Technology. If dusts and mists could be knocked out of gases by passing these through fixed beds of broken solids, they reasoned, why couldn't an even better job be done by fluidizing the bed and thus increasing the number of knock-out collisions between the solids and the dust or mist particles? They tried the method on a laboratory scale and reported their results at the 15th Annual Chemical Engineering Symposium held at M.I.T. last December.



MICKLEY & MEISSNER: More motion, more hits. . . .

Operating on air laden with sulfuric acid mist, the Meissner and Mickley apparatus gave 95% removal of the mist (particle size 2 to 12 microns) when the air was passed up through a fluidized bed of silica gel or clay at 3 ft. per second. The bed was made of particles all finer than 170 mesh, weighed 32 lbs. per sq. ft. of cross-sectional area, and presented a pressure drop across it under these conditions of about 6 in. of water.

Mist removal was found to improve both with increasing gas velocity through the bed and with increasing bed weight. Depending on porosity, the bed picked up 5 to 10% of its weight of acid before losing its effectiveness.

Dust to Dust

The M.I.T. professors have also carried out preliminary work on ammonium nitrate smoke which indicates that fluidized beds may be effective in removing dusts as well as mists.

This may cause some raising of eyebrows among those familiar with fluo-solids operations, since fluidized beds themselves are usually a source of dust due to carryover of the bed particles in the tail gas. In fact, cyclones are usually operated in conjunction with fluidized solids beds to recover these particles and return them to the bed. When the bed material is worth the added cost, an electrostatic precipitator is operated on the tail gases to achieve complete recovery of the solids.

However, the loss of these bed solids is small, and their particle size is usually much greater than that of the mists and dusts encountered in gas cleaning operations. Therefore, when used for gas scrubbing, fluidized beds are really a means of substituting a small quantity of relatively coarse, fast settling, dust particles for a large quantity of very fine and stable dust particles.

From a dollars and cents standpoint the big drawback of fluidized beds for gas

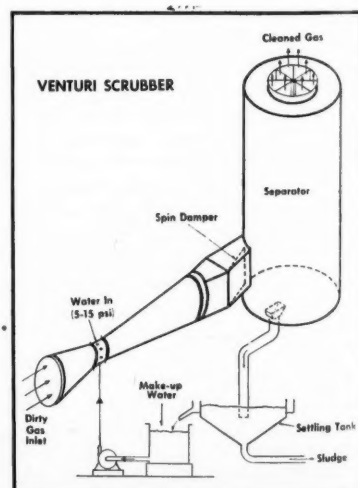
cleaning appears to be cost of revivification or replacement. It is not anticipated, therefore, that the technique will extensively displace existing methods, but it may find application under certain special conditions.

Venturi Uses Spray

The Venturi scrubber also makes use of accelerated motion to increase the number of impacts between the scrubbing medium—in this case a liquid—and the particles in the gas. Like the fluidized bed apparatus, it was developed to overcome the problem of extremely fine dusts and mists. Its operation and some commercial installations were described before the American Chemical Society in San Francisco last month by William P. Jones, of the Chemical Construction Corp., licensee and seller of the device for Pease, Anthony.

The apparatus is simple. A scrubbing liquid—usually water—is introduced into the neck of an ordinary Venturi tube. The dirty gas passing through the Venturi at high speed atomizes the scrubbing liquid to permit intimate contact between the liquid and the particles of dust or mist in the gas. The liquid droplets carrying the material to be removed subsequently coalesce and are separated from the gases in a cyclone separator. The scrubbing liquid may be recirculated to the Venturi after settling to remove insoluble solids.

Gas velocities at the Venturi throat usually range from 200 to 400 ft. per sec. Water requirements vary from 2 to 7 gals. per M cu. ft. of gas, depending on the physical and thermal characteristics of the gas and the dust to be removed. Pressure drop across the Venturi may range from 10 to 15 in. of water, and



VENTURI SCRUBBER: . . . more hits, more knockouts.

What's new

normally a fan power of 2.25-3.50 hp. is required per M cu. ft. of cooled, clean gas per min. In recent work removal efficiencies as high as 99 per cent have been achieved.

Used on Stack Gases

Several commercial installations of the Venturi scrubber are now in operation. The Thilmany Pulp and Paper Co., Kaukauna, Wisconsin, is reported to be successfully treating 50,000-60,000 cu. ft. per min. of stack gases from the chemical recovery furnace of a kraft pulp and paper mill to recover 7-10 tons per day of valuable sodium compounds. Particle sizes range from below 0.1 to 1.5 microns.

Two large Venturi scrubbers have been in operation for over a year in the recovery of iron oxide dust from open-hearth furnace gases. The Venturis have throat diameters of 19" and 12" respectively and are connected in parallel to handle between 70,000 and 80,000 cu. ft. per min. of gas at 700° F. From 97 to 99.5% removal of dust is obtained, with the particles in the mean diameter range of 0.11 to 0.4 microns and an appreciable number in the 0.05-0.10 micron range.

Pilot plant studies indicate that the scrubber is effective in removing sulfuric acid mist from acid concentrator tail gas, contact plants, or fumes from copperas roasting operations.

The Venturi scrubber has the advantages of low initial and low maintenance costs, and simplicity of construction and operation. Power is the principal operating cost. For installations such as those mentioned, which operate on extremely fine particles, it has proved to be economically sound.

ALL OF A SIZE

Uniform particle-size iron oxide red pigment has high color purity.

EVER since some savage progenitor of the human race picked up a handful of red earth thousands of years ago and daubed it on his face, iron oxide has been used as a pigment. Until the comparatively recent development of synthetic iron oxides, however, men were content to seek out natural ores with the best pigment properties.

The best pigment-grade iron oxides are found in Spain and around the Persian Gulf; and when these sources became uncertain during the war, substitutes—usually blends of domestic natural and synthetic pigments—appeared on the market. None, however, matched the color quality of Persian Gulf oxides.

About ten years ago Minnesota Mining & Manufacturing Co. started a research

program that led to two new types of iron oxide pigments: calcined ferric sulfate, and a brand-new type, still in its swaddling clothes, called "Krox" (*CI Newsletter, April 1949*).

Four Processes

The first of these is from the fourth synthetic oxide process to be developed. Iron ore is treated with sulfuric acid to yield ferric sulfate. (There is no need to remove the inert silica and silicates.) The sulfate is dried in a rotary kiln drier and then calcined in a rotary kiln to give ferric oxide and sulfur trioxide. The oxide cinder is ground to pigment and the sulfur gas is reconverted to sulfuric acid. The entire process is continuous and carefully controlled to give a uniform product.

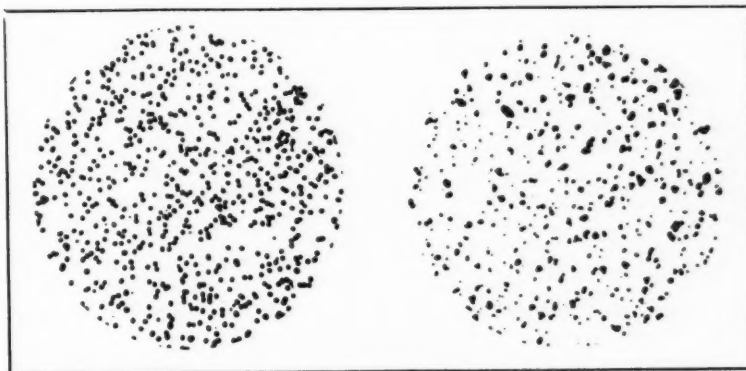
The three earlier-developed processes

basic types of iron oxide pigments in order to show what Krox isn't. While the 3-M company won't say what raw materials are used or what process it employs, it does say that the process is none of the four described, and that the raw materials, too, are different.

Krox is Different

Whatever the raw materials and process may be, Krox is different enough from previous iron oxide pigments to be getting a lot of attention from paint-makers. Chief interest is in its high color purity,* which approaches that of organic toners.

It was evident to 3-M's researchers that the color of an oxide pigment becomes purer as the range of particle sizes becomes smaller. The secret of Krox, then, is the technique of producing a pigment



KROX (left) VS. COMMON TYPE: A low coefficient of variation looks better.

employ copperas (hydrated ferrous sulfate) or scrap iron:

Calcined ferrite yellow is made by oxidizing copperas solution with air to give hydrated ferric oxide. The sulfuric acid thus liberated reacts with scrap iron to replenish the ferrous sulfate. The oxide deposits on colloidal nuclei furnished by the "starter suspension," a hydrated ferric oxide suspension obtained by the oxidation with air of ferrous hydroxide, which in turn is made by the reaction of ferrous sulfate solution with sodium hydroxide or soda ash. The overall reaction is continued until the crystals are of the proper size to give the desired shade. They are then filtered, washed, dried and calcined to pigments known in the trade as precipitated red iron oxides.

Calcined ferrous sulfate pigments are made from copperas by a two-step dehydration (to the monohydrate) and calcination (to ferric oxide).

Venetian reds are mixtures of iron oxide (10-40 per cent) with calcium sulfate as an extender. They are made by calcining mixtures of copperas and lime.

It has been necessary to review the

wherein the particles are all of a size. Krox is actually a trade name for a series of pigments differing in color—which is the same as saying that they differ in average particle size.

The 3-M chemists speak knowingly, in the jargon of statisticians, of particle size distribution curves and standard deviations. Suffice it to say that the coefficient of variation (a low value of which indicates a high degree of uniformity) of Krox dark red is 10.4, while that of a typical calcined iron sulfate type is 60.4. This is the statistical interpretation of the obvious difference shown in the accompanying photomicrographs (*see illustrations*).

Darker Shades

Close control of particle size makes it possible to produce Krox in darker shades (maroons) than have ever been obtained in iron oxide pigments.

Because of the obviously improved color

* Purity, or saturation, is a measure of color "richness." It can be thought of as "freedom from grayness" and given a quantitative meaning by assigning a value of 100% to pure monochromatic light of the same hue and 0 to a gray of the same brilliance.

clarity of Krox pigments, 3-M says that "although Krox is Fe_2O_3 , any approach to its applications warrants its being considered as a new line of red pigments rather than as another iron oxide."

The pigments, which are made in five shades of red, are sold in 50-lb. steel containers at \$1 a pound. "Whether that price is high or low," says a 3-M man, "depends on what comparison you make. Most iron oxide pigments sell for something like 12¢ a pound—which makes "Krox" look prohibitively expensive. And many organic pigments sell at about \$8.25 a pound—which makes "Krox" look like a give-away."

Krox is now used commercially in floor enamels, trim paints, auto and farm implement enamels, industrial finishes, and in coloring plastics such as polystyrene, polyvinyl chloride, and polyvinyl acetate. Because it is quite new, exposure tests are not complete. The two-year tests that have been carried out, however, where Krox has been incorporated in automotive enamels, house paints, and trim colors, have so far verified the expected permanency.

BIGGER GAME

Combination of chemicals repels deer from farmers' crops.

PEST CONTROL has progressed in the past half century to larger and larger victims. First (about 60 years ago) it was discovered that minute fungi could be eradicated by copper salts; then insects succumbed to the attack of natural and synthetic insecticidal agents; and now crop damage by weightier members of the animal world—mice, rabbits and deer—gives promise of yielding to a combination of chemicals discovered by L. L. Baumgartner, in charge of B. F. Goodrich's biochemical laboratories at Boyce Thompson Institute for Plant Research.

Deer Damage

Marauding deer are no small problem, particularly in the winter months, in many areas—especially New England. They nibble at the tender bark of young fruit trees, succulent field crops, and decorative shrubbery. Annual damage probably runs well into millions of dollars.

Countrymen had tried everything under the sun to discourage the beasts: manure, creosote, and camphor, among others. But none was particularly successful; all were inconvenient, expensive, or offensive.

It was to solve this problem that Baumgartner set about studying various chemical combinations. He came up with one that B. F. Goodrich Chemical Co. is preparing to distribute under the name of Goodrite z.i.p.



L. L. BAUMGARTNER: Persuader against mischief.

Zip sounds like a standard trade name, but it is actually an abbreviation of the material's chemical constitution, "z.a.c. in p.e.p.s." Z.a.c. is zinc dimethyldithiocarbamate-cyclohexyl amine complex, and p.e.p.s. is polyethylene polysulfide. Both constituents are Goodrich products, the former a fungicide, the latter a sticking agent for agricultural sprays. In Zip the two are blended at the plant in the proper proportion for optimum effectiveness.

Baumgartner was led to the discovery by preliminary evidence that z.a.c. exerted a repellent effect. Combination of it with p.e.p.s., it turns out, not only increases adherence to plant surfaces, but also enhances repellency. Baumgartner's explanation: Z.a.c. has an unpleasant taste but is odorless, while p.e.p.s. has an odor. The deer, once having tasted the mixture, come to associate z.a.c.'s disagreeable taste with p.e.p.s.'s characteristic odor.

Smart Critters

The non-toxic mixture is sprayed on the trees, shrubbery, or crops. It isn't enough to "ring" a field or orchard with the repellent; the smart deer will wander through the "wall," will feast on the untreated center portion.

Goodrich plans to package Zip in one- and five-gallon units as well as larger drums. Most of it will be sold through jobbers and distributors.

Who'll buy it? Some individuals—farmers, gardeners, tree surgeons, estate owners—are already purchasing the material. But a large proportion will be bought by state conservation departments and distributed free of charge.

Here's the angle: Many states like having wild deer around to attract sportsmen. The farmers are therefore not allowed to shoot deer, and the state assumes responsibility for any damage the crea-

tures may do. The depredations are paid for out of the money received for hunters' licenses. (Maine, for example, paid out some \$200,000 last year for damages.) The states would rather use the money, naturally, for such constructive wild-life projects as fisheries and game preserves. It is to their advantage, then, to buy an ounce of Zip for prevention rather than pay out a pound of gold to cure a farmer's just grievance.

Other Pests

While deer damage has received the most attention, Zip is being studied for use against other four-legged mischiefs. There is much interest in the South, where cattle often roam about unimpeded by fences. There is some indication, too, that Zip repels mice and rabbits. Curiously, it also repels the Mexican bean beetle.

Because many farmers don't bother with the red tape necessary to collect damages, Goodrich doesn't know what the potential sale of Zip may be—but they're sure it will be a steady, comfortable amount.

CARBIDE'S CARBOLIC

New plant will synthesize a large portion of Bakelite's phenol needs.

THE nation's largest phenol consumer, Bakelite Corp., a division of Union Carbide and Carbon Corp., is planning to again synthesize a large share of its requirements at a new plant south of Marietta, Ohio. This plant will not produce all the phenol the company needs, inasmuch as the company indicates it will continue purchasing phenol after the new plant has been completed.

It is understood that the new unit will add well over 50 million pounds a year to the nation's present estimated capacity of 320 million pounds annually—up a third since last July (*CI, July 1948, p. 46*). This latter increase was provided by a new unit of Dow Chemical Co. at Midland, Mich. (30 million pounds per year) and a reported increase at Durez Plastics and Chemicals, Inc. (about 10 million pounds annually).

Bakelite has made no specific statement as to the current status of the project other than to note that the plant is expected to be operating by late 1950. If, as reported, the company intends to let the contract for construction only on a lump-sum basis, then the engineering must be quite well along. (Ordinarily engineering for a contract of this type must be nearly complete before the contract can be let and construction begun. If both still had to be completed, it is questionable if the plate could be ready before 1951.

In any event Bakelite's present suppliers will have a full eighteen months to locate other uses or other markets; or possibly the market for phenol-formaldehyde plastics will expand to the point where all plants will be required. It is of interest that one of Bakelite's present suppliers, Dow, although a strong factor in the plastics industry, is not a producer of phenolic resins.

Raschig?

The original announcement of the new plant noted that phenol will be produced under a patent granted to the late Dr. L. V. Redman, formerly vice-president of Bakelite. This patent (U.S.P. 2,311,777) calls for the catalytic hydrolysis of monochlorobenzene in the presence of an excess of steam at a temperature of 400-600° C. As would be expected, lower temperatures give a slower rate of reaction and a smaller quantity of possibly undesirable by-products.

Tricalcium phosphate is the catalyst stressed by the patent claims, although a large number of metallic phosphates and silicates are mentioned, unpromoted or promoted with a cupric salt. The copper content of the catalyst must be reduced to the cuprous state before use.

The patent further suggests use of the hydrogen chloride formed by the hydrolysis for chlorination of the benzene, presumably with the aid of air and a catalyst, *a la* the Raschig process—used in the United States by Durez. Bakelite declines to comment, however, on how the chlorination at the new plant will be effected.

SYNTHETIC PYRETHRUM

FIFTEEN years' research by F. B. La Forge and his colleagues in the USDA's Bureau of Entomology and Plant Quarantine have culminated in the synthesis of esters closely resembling those responsible for the insecticidal action of pyrethrum.

Pyruvic acid is condensed with a β -keto acid to give a hydroxydiketone, which in turn is cyclized to a cyclopentenolone. The latter is acylated with *d*-chrysanthemum monocarboxylic acid, which occurs naturally in pyrethrum and can be synthesized from ethyl diazoacetate and 2,5-dimethylhexadiene-2,4. Chemically the acid is 1-carboxy-2-isobutenyl-3,3-dimethylcyclopropane.

The synthetic ester, which is still far from the commercial stage, is as effective and more stable than the natural product. Like natural pyrethrum—and unlike many of the newer synthetic insecticides—it is non-toxic to higher animals.

Since some of the intermediates are not made commercially, much development still lies ahead; insecticide makers will follow it keenly.

FIRE EATER

Chlorobromomethane, German-developed fire extinguisher, made by two U. S. firms.

SINGLED out by the German Navy in 1941 as the only fluid permitted for the fixed fire-extinguishing systems on its vessels, chlorobromomethane has crossed the ocean to join the ranks of commercial fire-fighting fluids.

Both Michigan Chemical Corp., St. Louis, Mich., and Dow Chemical Co., Midland, Mich., are now turning out the low-boiling (152°F.) liquid for use in extinguishers for automobiles, airplanes, and the home.

Colorful History

The history of chlorobromomethane started ten years ago, when I. G. Farbenindustrie tested it and submitted it to German military leaders. The Navy

filtering back to this country. Both Michigan and Dow based their preliminary investigations on the German technical reports.

Less Corrosive, More Stable

The colorless liquid with a chloroform-like odor has a low freezing point (−124°F.) and evaporates to a heavy vapor—qualities which recommend it as an extinguishing agent. It is also chemically stable and dielectric, so that it can be used safely on electrical fires. Dow's tests indicate that it is less corrosive than other commonly used liquids to the metals used in extinguisher construction.

The vapor and the gaseous decomposition products are hazardous, but not more so than those of other chlorine-containing materials. Care must be taken, however, when the compound is used in closed spaces.

Chlorobromomethane is now being used in standard types of extinguishers—both



CB ON GASOLINE: One pint and ten seconds sufficed.

shortly adopted it because of its high efficiency.

The following year Junkers started research to develop a fire-extinguishing system for airplanes—and not a moment too soon, for statistics revealed that over half of the fighter planes and three-quarters of the bombers shot down were lost on account of fire. Large-scale tests proved to the *Luftwaffe* that CB, as the material is called, was the most efficient; and commercial plants to produce it were started by I. G. Farben at Frankfurt am Main/Höchst.

Allied bombings in January, 1945, prevented their being completed, and a few months later, after VE Day, technical details about chlorobromomethane began

the hand-pump type and the pressurized type, where carbon dioxide is the propelling agent. The U. S. Navy, which found it particularly useful for extinguishing magnesium incendiary fires, is buying quantities of it.

Price Handicap

CB has a terrific price handicap to overcome: it sells for about 65¢ a pound as against 8½¢ for carbon tet. But both manufacturers base their optimism on its incontrovertible advantages: greater efficiency (less than half as much does the job), the weight saving resulting therefrom, and minimized danger of equipment corrosion. They're enough to have won several customers already.

DOLLAR FIGURES IN
MILLIONS,
balance sheet figures are
at year end.

**COMPARATIVE
FINANCIAL SUMMARY OF
23 CHEMICAL COMPANIES
FOR THE YEARS 1939, 1947, 1948**

	Year End					
Year	Market Value of Equity	Value of Total Assets	Current Assets	Current Liabilities	Working Capital	
1939	\$4,045.2	\$1,552.4	\$ 663.4	\$120.1	\$ 543.3	
1947	4,674.0	2,988.9	1,508.6	407.8	1,100.8	
1948	4,694.7	3,272.5	1,507.2	423.5	1,083.7	
% Change 1947-1948	0	+10	0	+4	-2	
% Change 1939-1948	+16	+111	+128	+252	+99	

1948 Records New Peak in Chemical

I. THE FINANCIAL SHOWING

by MICHAEL PESCATELLO*

CHEMICAL COMPANIES IN 1948 reached new heights in sales and earnings. But the signs also were that the postwar honeymoon is over.

THERE are two significant factors revealed by an analysis of the reports of twenty-three leading chemical companies for the year 1948.

One is the definite indication that activity is leveling off. This fact is revealed in two ways. Capitalization changes which reflect management's plans for expansion and rehabilitation were moderate in the aggregate compared to the substantial increases up to the beginning of 1948. Last year total debt of the twenty-three companies declined by \$4.1 million and preferred stock increased by only \$73 million. Two companies—Dow and Monsanto—accounted for the major part of this increase. There was very little change in common stock outstanding while surplus, representing almost entirely "plow-back" of earnings, increased by almost \$200 million during the year 1948. The principal capital changes made by seven companies are:

Dow Chemical Co.—increased its preferred stock by \$40 million to a total of \$70.4 million.

Monsanto Chemical Co.—increased its preferred stock by \$24 million to a total of

\$33 million. Eliminated debt of \$30 million. Hooker Electrochemical Co.—increased its preferred stock by \$5 million to a total of \$10 million.

Mathieson Chemical Corp.—incurred long term debt of \$10 million.

Pennsylvania Salt Mfg. Co.—increased debt from 0 to \$3 million, increased preferred stock from 0 to \$4.4 million.

International Minerals & Chemical Corp.—increased debt by about \$5 million.

Virginia-Carolina Chemical Corp.—increased debt by about \$3 million.

It is significant that the preferred stocks issued by all of the four companies are convertible into common. This is one indication of the ability of the industry to finance its capital requirements on a comparatively favorable basis through equity issues, and the desire of most companies in the field to provide for a large proportion of common stock funds in their capitalization.

The second way in which the leveling-off was noticeable in 1948 was the reversal in sales trend experienced by three of the twenty-three companies. Commercial Solvents sales declined 24 per cent from 1947, Hercules Powder 2 per cent, and Newport Industries 4 per cent. This adverse change in dollar volume was due to special circumstances—the chaotic situation in the price of alcohol and the price

declines in naval stores. The predominant factor, then, if not the sole cause of the decline in sales, was price rather than demand. It is probable, however, that these factors are assuming greater influence on sales and profit trends. Particularly noteworthy is the effect on profits in the three cases where sales declined.

	Per Cent Decline 1948 From 1947	
	Sales	Net Income
Commercial Solvents	24%	46%
Hercules Powder	2	15
Newport Industries	4	50

Although it may be misleading to use these three examples as criteria, the evidence seems to indicate that profits can decline to a much greater extent than sales. This is a fear that is plaguing managements as well as investors.

SALES AND EARNINGS UP

A second significant factor revealed in the reports of the twenty-three companies is that new high records were established in both sales and net income. Last year these companies in the aggregate reported a record net income of \$413 million which was 122 per cent above the net income of \$186 million earned by the same companies in the year 1939. Sales last year amounted to \$3.3 billion compared with \$1 billion in 1939, or an increase of 234 per cent.

It is interesting to note that last year the twenty-three chemical companies reported 10.9 cents of net income for each dollar of sales. By contrast, in 1939 they reported 15 cents of net income for each dollar of sales. Lest this be interpreted

Year End				Net Oper. Inc.					
Debt	Par Value Pfd. Stk.	Net Worth	% Earned on Net Worth	Sales	Millions	% of Sales	Net Income	Com. Div's.	Year
\$ 67.8	\$244.2	\$1,484.0	12.6%	\$1,006.8	\$176.6	17.7%	\$186.5	\$140.0	1939
369.6	425.1	2,368.5	14.1	2,883.8	529.6	18.4	335.3	192.1	1947
365.5	498.2	2,638.4	15.7	3,336.9	619.4	18.6	413.4	228.5	1948
- 1	+17	+11	.....	+15	+17	.....	+23	+19	% Change 1947-1948
+438	+104	+78	.....	+234	+251	.....	+122	+63	% Change 1939-1948

Industry Activity

to mean that the companies have become less efficient, it is important to note at this point that the facts prove otherwise. Last year, *net operating income* amounted to 18.6 per cent of sales compared to 17.7 per cent in 1939.

Although much of the present day discussions concerning profits centers around the question of increased costs of doing business, this analysis indicates that chemical companies, as a group, have been able to adjust their operations and policies to the material changes that have occurred since 1939 and also improve their profit margins. The point that cannot be overemphasized is the fact that between operating profit and net income, taxes take a very big bite. Business has not become less efficient or less profitable. The problem is that profits are being shared to a much greater extent with the tax collector. Enterprise is free to the extent of trying to make a profit, but the division of these profits, when they exist, raises the question as to whether the magnitude of the "take" through taxes has not become too burdensome.

ASSETS LEVELING OFF

At the end of the 1948 period, the twenty-three chemical companies had combined assets valued at \$3.2 billion. This was more than double (111 per cent) the figure of \$1.5 billion at the end of the 1938 period. The increase of total assets in 1948 over 1947 was 9 per cent, which compares with an increase of 27 per cent in 1947 over 1946. This reduction in the rate of increase is also in-

dicative of the tapering-off process that has been under way.

On the average, the twenty-three companies in 1948 had \$1.02 of sales for every dollar of assets. This compares with a figure of \$0.97 in 1947 and \$0.64 in 1939 of sales for each dollar of assets in each of these years. There appears to be a favorable trend in the utilization of assets year by year.

It is interesting to note the marked difference in 1948 as between individual companies. The company reporting the lowest ratio of sales to total assets was Dow with sales of 63 cents for each dollar of assets. As a statistic this shows the company inferior in utilization of assets relative to the others. But the achievement of Dow has been so outstanding as to necessitate closer scrutiny of other factors. To a large extent the explanation lies in the fact that the company's expansion of facilities has been so great that full utilization can come only with the passage of time.

At the end of 1948, current assets of the twenty-three companies remained practically unchanged at \$1.5 billion from the preceding year. Current liabilities increased slightly so that in 1948 the current ratio declined to 3.6 to 1 from 3.7 to 1 at the end of 1947, and 5.5 to 1 at the 1939 year end. Working capital amounted to \$1 billion at the end of last year, or approximately double the 1939 figure. In the aggregate these companies have tended to maintain their traditionally strong working capital positions. The large expansion programs and material

increase in volume of sales have, however, continued to make inroads on this strong position. In the nine years from 1939 to the end of 1948 the changes in three important items compare with the increase in working capital as follows:

Per Cent Increase 1939 to 1948	
Working Capital	99%
Debt	438
Preferred Stock	104
Sales	234

In 1948 the twenty-three companies reported net income of \$413 million, an increase of 23% above 1947 income, or approximately the same rate of increase as that of the previous year (22%). As has already been stated, net income in 1948 was 122% above that of 1939, while sales were 234% above the \$1 billion of sales reported in 1939. The 1948 relationship of sales and net income does not compare favorably with that of 1939, and recent trends indicate that a return to a somewhat comparable relationship is difficult to achieve. The trend was favorable in 1948 compared with 1947. Net income (excluding Du Pont's General Motors dividend) increased 21% while sales rose by 16%. In 1947 the increase in net income, on the same basis, was 20% above 1946 while sales increased 22%.

Operating profit continued to show steady improvement. It reached a new high of \$619 million in 1948. This was 251% above the 1939 figure and compares with a 234% increase in sales between 1939 and 1948. The margin of profit was 18.6% in 1948 and compared to 18.4% in 1947 and 17.7% in 1939. These figures are indicative of the ability of the industry to maintain profit margins. Of equal significance is the fact that the aggregate figures show no abnormal or unusually large profit margins now compared to those reported in 1939.

NET WORTH GAINS

Total net worth at the end of 1948 amounted to \$2.6 billion, or more than \$1 billion above the \$1.4 billion of net

TWENTY-THREE CHEMICAL COMPANIES—COMPARISON 1948, 1947 AND 1939

(All figures in millions of \$)	Year	Year End										Common Dividends
		Market Value of Equity	Total Assets	Current Assets	Current Liabilities	Working Capital	Par Value		Sales	Net Operating Income	Net Income	
							Debt	Preferred Stock				
Air Reduction (1).....	1939	146.1	38.7	20.0	3.4	16.6	....	....	27.6	6.0	5.1	3.8
	1947	71.8	84.4	40.4	9.7	30.7	30.0	....	85.5	9.0	5.7	2.7
	1948	51.7	89.2	42.6	11.9	30.7	29.5	....	94.9	11.0	6.5	2.7
Allied Chemical & Dye (1)....	1939	391.9	207.7	108.1	12.5	95.6	....	....	168.0	23.0	21.0	19.9
	1947	419.6	288.0	178.8	40.5	138.3	....	....	365.9	59.0	30.3	19.9
	1948	400.8	306.9	160.3	42.7	117.6	....	....	387.7	59.7	31.8	19.9
Amer. Agri. Chem. (2).....	1939	12.6	21.5	14.3	0.8	13.5	....	....	17.6	0.73	0.76	0.87
	1947	31.7	35.7	24.6	7.1	17.5	....	....	41.1	6.8	4.3	1.9
	1948	22.0	37.7	24.6	7.3	17.3	....	....	43.1	6.6	4.1	1.9
American Cyanamid.....	1939	89.0	77.3	39.4	9.0	30.4	12.0	4.7	75.0	6.4	5.5	4.2
	1947	109.5	206.6	101.8	34.2	67.6	61.7	39.1	214.6	16.6	9.2	4.1
	1948	105.7	212.0	102.8	34.1	68.7	62.4	39.1	232.0	19.4	11.9	4.4
Atlas Powder (3).....	1939	16.0	18.4	9.4	1.3	8.1	....	6.8	16.5	1.5	1.3	0.75
	1947	16.3	29.5	17.6	4.1	13.5	3.0	6.8	41.2	3.0	2.0	0.64
	1948	15.5	29.0	16.5	3.1	13.4	3.0	6.8	43.1	1.9	1.3	0.65
Commercial Solvents.....	1939	36.9	20.0	13.8	2.5	11.3	....	....	14.4	1.4	1.6	....
	1947	59.3	37.5	20.5	5.3	15.2	....	....	54.9	13.4	9.1	3.9
	1948	43.8	39.9	17.1	3.9	13.2	....	....	41.5	7.7	5.5	3.9
Davison Chemical (2).....	1939	3.6	11.7	6.1	0.3	5.8	1.4	....	9.5	-0.27	-0.29	....
	1947	11.7	21.8	10.0	1.6	8.4	3.7	....	25.4	3.2	1.8	0.51
	1948	9.8	25.2	12.3	2.1	10.2	4.7	....	33.5	4.7	2.6	0.64
Dow Chemical (4).....	1939	148.6	41.8	14.3	2.6	11.7	5.7	6.0	26.8	3.8	4.2	2.9
	1947	198.5	213.6	59.8	26.8	33.0	65.9	30.4	130.4	19.8	12.7	4.1
	1948	240.4	271.5	83.2	29.1	54.1	68.2	70.4	170.7	34.9	21.1	5.0
Du Pont (1).....	1939	2,013.9	538.8	209.3	47.1	162.2	....	168.8	298.8	67.2	93.2	77.4
	1947	2,079.9	852.7	412.8	86.4	326.4	....	268.9	783.4	177.8	120.0	88.9
	1948	2,057.6	897.8	406.8	87.1	319.7	....	268.9	968.7	215.2	157.4	108.7
Hercules Powder (5).....	1939	117.2	44.1	21.6	2.9	18.7	....	9.6	41.0	6.2	5.3	3.7
	1947	138.3	80.7	45.0	15.0	30.0	....	9.6	131.3	21.5	12.9	5.3
	1948	119.3	84.0	47.0	12.6	34.4	....	9.6	129.3	17.8	10.9	5.9
Hooker Electrochemical (6)...	1939	2.1	7.4	2.4	0.6	1.8	2.6	2.7	5.7	0.62	0.4	0.1
	1947	29.0	20.6	8.4	1.6	6.8	3.0	5.0	20.2	3.3	2.2	0.77
	1948	23.3	27.4	13.2	1.8	11.4	3.0	10.0	23.7	4.3	2.9	0.97
Int'l Minerals & Chem. (2)..	1939	0.9	26.7	6.5	0.4	6.1	3.3	10.0	11.7	0.16	0.13	....
	1947	26.3	47.1	13.9	2.6	11.3	7.9	9.9	41.3	6.1	3.8	1.0
	1948	21.8	56.5	16.6	3.4	13.2	13.1	9.9	50.1	7.1	5.0	1.3
Mathieson Chem.....	1939	24.8	24.8	4.5	0.8	3.7	....	2.4	10.9	1.4	1.1	1.2
	1947	27.1	37.1	9.3	8.9	0.4	....	2.4	24.6	4.8	2.9	1.3
	1948	32.3	49.0	11.1	5.8	5.3	10.0	2.4	31.9	7.6	4.8	1.3
Monsanto Chemical.....	1939	135.3	54.7	20.8	6.0	14.8	....	11.9	42.9	7.2	5.4	3.7
	1947	259.4	153.1	60.2	21.4	38.8	30.5	9.2	143.4	26.1	15.6	8.0
	1948	200.9	173.0	69.2	17.3	51.9	....	33.0	167.6	27.0	18.0	8.5
National Cylinder Gas.....	1939	12.2	6.9	1.7	0.5	1.2	....	....	4.9	2.4	1.0	0.47
	1947	18.4	24.8	8.6	2.2	6.4	4.9	3.2	23.1	2.0	2.1	1.1
	1948	15.4	27.1	8.6	3.6	5.0	4.7	3.1	25.9	2.3	2.7	1.1
Nopco Chemical.....	1939	7.9	4.7	3.1	0.8	2.3	1.2	....	7.7	1.2	0.7	0.33
	1947	7.8	10.2	6.8	1.4	5.4	....	2.4	18.5	1.6	0.69	0.39
	1948	5.2	10.3	6.8	1.4	5.4	....	2.4	20.1	1.4	0.59	0.35
Newport Industries.....	1939	8.1	5.7	2.7	0.4	2.3	0.7	....	4.6	0.5	0.4	....
	1947	15.0	14.9	5.5	2.5	3.0	....	3.9	15.4	4.1	2.6	1.2
	1948	7.8	16.1	6.6	1.5	5.1	2.0	3.9	14.8	2.0	1.3	0.93
Pennsylvania Salt Mfg. Co. (2)	1939	25.2	16.7	7.8	0.9	6.9	....	....	9.6	1.3	1.3	0.75
	1947	34.9	27.3	13.0	5.0	8.0	....	....	29.2	3.9	2.7	1.3
	1948	27.1	35.4	14.1	4.6	9.5	3.0	4.4	32.4	3.1	2.3	1.1
Pfizer, Chas. & Co.....	1939	14.0E	....	....	....	....	....	....	6.2	1.1	0.87	0.73
	1947	81.8	42.8	29.3	11.2	18.1	....	5.0	39.2	15.3	9.3	4.1
	1948	67.3	48.4	31.4	11.1	20.3	....	5.0	47.8	16.6	9.6	4.1

TWENTY-THREE CHEMICAL COMPANIES—COMPARISON 1948, 1947 AND 1939

(All figures in millions of \$)	Year	Market Value of Equity	Total Assets	Current Assets	Current Liabilities	Working Capital	Par Value		Sales	Net Operating Income	Net Income	Common Dividends
							Debt	Preferred Stock				
Union Carbide & Carbon.....	1939	807.2	336.8	133.4	22.6	110.8	40.0	....	170.3	42.9	35.8	18.3
	1947	976.4	649.1	378.4	102.7	275.7	150.0	....	521.8	115.8	75.7	37.7
	1948	1,184.7	722.7	356.0	125.0	231.0	150.0	....	631.6	155.2	103.3	52.7
U. S. Industrial Chem. (7)...	1939	9.0	13.8	9.8	2.3	7.5	....	....	11.9	0.10	0.08	....
	1947	20.3	51.9	34.2	11.1	23.1	7.5	....	69.7	5.9	3.6	1.7
	1948	10.0	46.7	27.3	6.5	20.8	7.5	....	73.3	2.3	2.6	1.2
Victor Chemical Works.....	1939	20.8	8.7	3.6	0.8	2.8	0.9	....	8.4	1.3	1.1	0.97
	1947	36.3	21.8	9.0	1.9	7.1	0.3	8.0	21.3	3.6	2.0	1.3
	1948	27.2	22.3	9.3	2.0	7.3	0.3	8.0	25.8	3.5	2.2	1.3
Virginia-Carolina Chem. (2)..	1939	1.9	25.5	10.8	1.6	9.2	....	21.3	16.8	0.43	0.51	....
	1947	4.7	37.7	20.5	4.6	15.9	1.2	21.3	42.4	6.4	4.1	....
	1948	4.1	44.4	23.8	5.6	18.2	4.1	21.3	53.4	8.1	5.0	....

(1) Certain outside investments of these three companies are excluded from total assets in the amounts shown below. Also shown is other income which is not excluded from net income.

	Certain Outside Investments Million \$	Other Income Thousand \$
Air Reduction.....	1939 \$5.5 1947 7.0 1948 5.2	\$67 740 700
Allied Chemical.....	1939 28.9 1947 42.8 1948 31.8	1,698 3,800 4,090

Du Pont (Gen. Motors Investment)..... 1939 197.0 35,000
1947 259.0 30,000
1948 291.5 45,000

- (2) Year or year ended June 30.
(3) Goodwill amounting to \$4.1 million excluded from total assets.
(4) Year or year ended May 31.
(5) Goodwill amounting to \$5.0 million excluded from total assets in 1939.
(6) Goodwill amounting to \$2.5 million excluded from total assets in 1939.
(7) In 1948 and 1947, data are for year ended March 31, except value of equity.

worth at the end of 1939. The twenty-three companies increased their net worth during the period by 78%. Earnings on net worth last year were 15.7% compared to 14.1% in 1947 and 12.6% in 1939. These figures reveal a steady improvement in rate of return on stockholders' investment. In this connection it is important to bear in mind, however, that the twenty-three companies had approximately \$300 million more of creditors' money (debt) working for them than they had at the end of 1939.

Last year the twenty-three companies paid out \$228 million in common dividends, or \$36 million more than was paid out in 1947. This compares with an increase of \$78 million in net income during the period. Between 1939 and 1948 net income increased by 122% while common dividends rose by 63%. The amount of common dividends distributed was 55% of net income in 1948 compared to 75% in 1939. Thus, in common with industry generally, the chemical companies are pursuing more conservative dividend policies and are retaining a larger proportion of net income.

A most noteworthy feature in the comparison of the various items in this summary is the moderate change in market values of common stocks. For example, at the end of 1948 the common stocks of the twenty-three companies had a total market value of \$4,694,000,000.

TWENTY-THREE CHEMICAL COMPANIES—1948 COMPARISONS EARNING POWER, FINANCIAL POSITION, TREND IN VOLUME OF SALES

	Earning Power—1948			Current Assets to Current Liabilities 12/31/48	Sales % Increase	
	Net Income to Sales	Net Income to Net Worth	Sales to Total Assets		1939-1948	1947-1948
Air Reduction.....	6.1%*	12.8%	106%	3.6 to 1	244%	11%
Allied Chem. & Dye.....	7.2%**	10.9	126	3.8	130	6
Amer. Agri. Chemical.....	9.5	14.5	114	3.4	145	5
American Cyanamid.....	5.1	10.4	110	3.0	210	8
Atlas Powder.....	3.0	6.1	148	5.3	161	5
Commercial Solvents.....	13.2	16.2	104	4.4	188	-24
Davison Chemical.....	7.8	14.0	133	5.9	254	32
Dow Chemical.....	12.4	12.3	63	2.9	538	31
Du Pont.....	11.6***	15.7	108	4.7	224	24
Hercules Powder.....	8.5	17.5	154	3.7	214	-2
Hooker Electrochemical.....	12.2	12.9	87	7.3	316	17
Int'l. Minerals & Chemical..	10.0	12.5	89	4.9	328	21
Mathieson Chem.....	15.1	16.1	65	1.9	193	30
Monsanto Chemical.....	11.1	15.2	93	4.0	290	17
Natl. Cylinder Gas.....	10.4	14.5	96	2.4	428	12
Nopco Chemical.....	2.9	6.6	195	4.9	161	9
Newport Industries.....	8.8	10.7	92	4.4	222	-4
Pennsylvania Salt.....	7.1	8.4	92	3.1 to 1	238	11
Pfizer, Chas.....	20.0	29.4	99	2.8	672	22
Union Carbide & Carbon....	16.3	23.4	88	2.8	271	22
U. S. Industrial Chemical...	3.6	8.1	156	4.2	516	5
Victor Chemical Works.....	8.5	11.8	116	4.7	207	21
Virginia-Carolina Chemical..	9.4	14.5	120	4.3	218	26
Average.....	10.9	15.7	102	3.6	234	16

* \$700,000 other income excluded from net income.

** \$4,100,000 other income excluded from net income.

*** \$45,000,000 other income excluded from net income.

This was an increase of only \$20 million above the 1947 year end market value. Yet between the two year ends, 1947 and 1948, common stock and surplus on the books increased by \$197 million, sales by \$453 million, net income by \$78 million and common dividends by \$36 million! The contrast with 1939 is even more striking since market value of the companies' equities increased by only 16% between the two year ends 1939 and 1948. There was a substantially greater increase in total assets (111%), working capital (99%), sales (234%), net income (122%) and common dividends (63%). Obligations senior to the common stocks, however, also increased materially—debt 438%, preferred stock, 104%. These data reflect in a significant manner the feeling of apprehension and concern that has prevailed in investment circles during the past several years.

OUTLOOK

There are definite signs that the economy is now passing through a phase of readjustment. The extent and duration

of this change appears to be the predominant question to which attention is being directed by businessmen and others. It does not seem reasonable to expect that the rate of business activity and production could be maintained at the boom levels reached after the end of World War II. As a natural consequence of that war, a highly abnormal demand was created both for consumer and durable goods. In due course, this demand is met and satisfied. In that sense, then, our economic activity has been shifting for the past year or more, to a more normal level in contrast to abnormal conditions that prevailed in the immediate post-war period. This change was inevitable and it is constructive. A characteristic of this economic readjustment is its timing and magnitude with respect to individual industries and companies. Thus, the steel and automobile industries have continued at a high rate of activity and now appear to be on the threshold of shifting from a sellers' to a buyers' market.

There are a number of factors which, in the aggregate, are important influences supporting a high though more normal

rate of business activity. Government expenditures, particularly the European recovery program and military appropriations, have an important bearing on the course of business activity. Capital expenditures during 1949 will again be around \$18 billion, and national income is likely to stay at a figure considerably larger than pre-war totals. The demand for goods and services is still very good. On the debit side, regulations and controls, budget deficits, high taxes, a shaky price structure and saturation in many lines of consumer goods all combine to form common ground for apprehension. There is a great fear psychology that permeates the atmosphere. Its basis seems to be a distrust of government policies, programs and methods. Until, in some way, this fear can be dispelled or alleviated, it is difficult to appraise prospects for the future with any degree of assurance and certainty. Despite this, the 1949 results for chemical companies should not be much different from the good overall record established in 1948. The tapering-off process probably will continue.

II. RESEARCH AND EXPANSION

by P. A. SINGLETON* and J. H. SPRAGUE, JR.**

THE MARCH OF NEW PRODUCTS continued last year, while construction trends were mixed. Streamlining of operations was in evidence.

1948 was a year of increased competition in the chemical industry. The buyer's market returned for many chemicals, and was in sight for many others. Sales continued to push upward, but profit trends were mixed. In light of these conditions, chemical firms intensified their research for the competitive struggle ahead, but in many instances construction expenditures were below the year before.

RESEARCH

The year was definitely one of greater research activity, as indicated by Figure 1. Almost every firm for which comparative data were available increased expenditures in 1948. Merck increased its research outlay by \$900,000; and Davison almost doubled expenditures with a forecast of further increases in 1949. The one company with a decrease still had the highest dollar expenditure reported.

The expansion of research facilities con-

tinued in 1948. Du Pont reinstated its laboratory expansion program, postponed in 1947, to provide adequate facilities for its present technical research staff of 1800. Included is a \$30 million expansion of its Experimental Station at Wilmington, to be completed in 1950. Commercial Solvents' \$2 million expansion is nearing completion. Harshaw completed its new research laboratories, and Carbide and Carbon's South Charleston research center will be finished this Spring. Pfizer considerably expanded its Brooklyn laboratories and is constructing a process development building. International Minerals is planning a new central research laboratory in the Chicago area. Companies mentioning new pilot plant facilities included USI, Merck, Hooker, and Pittsburgh Coke.

Staff increases were also prevalent. Companies reporting increases included Pfizer, Davison, and Nopco.

The support of university research was an active part of many research programs. Fellowships were mentioned by

Du Pont (\$225,000), Hooker, Merck, Celanese, and Pittsburgh Plate Glass. In addition, Du Pont, Celanese, and Pittsburgh Plate helped underwrite the costs of research at leading universities, the latter two in nuclear research.

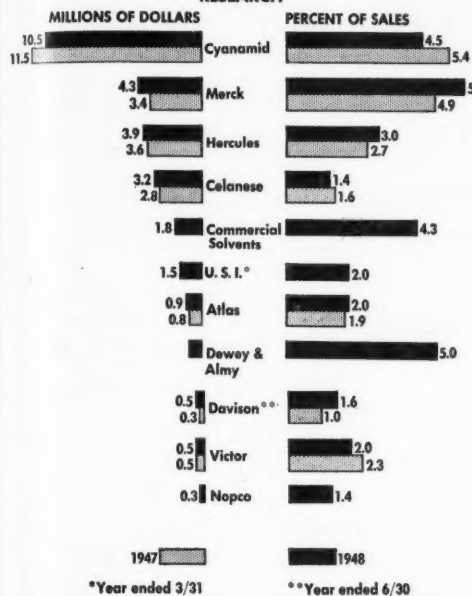
CONSTRUCTION

While research was being intensified, trends in construction were mixed, as is shown by the chart on page 751 and table on page 752. The chart shows a comparison of 1947 and 1948 capital expenditures for firms with sales above \$50 million, the firms being ranked in order of 1948 sales. The table shows similar data for firms with sales in the \$20-50 million range.

As is indicated by the chart, Merck's expenditures were more than double 1947 (a 34 per cent expansion) and the three largest firms, Du Pont, Union Carbide, and Allied, as well as USI and International Minerals, all showed increases. Four sharp decreases were reported, however, Dow, Hercules, Air Reduction, and American Cyanamid spending only about one-half as much as in the previous year. Dow's drop was not unexpected inasmuch as nearly one-half the previous year's expenditure was for the purchase of two government plants at Velasco, Texas. Hercules had also predicted a drop, stating in 1947 that its post-war program was substantially complete. Cyanamid's \$17 million brought its five-year expenditures to \$97 million.

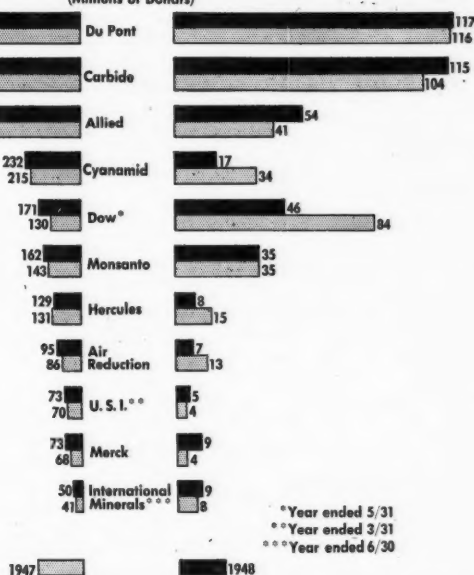
*Vice President, New England Alcohol Co., Boston, Mass.
**Monsanto Chemical Co., Washington, D. C.

RESEARCH



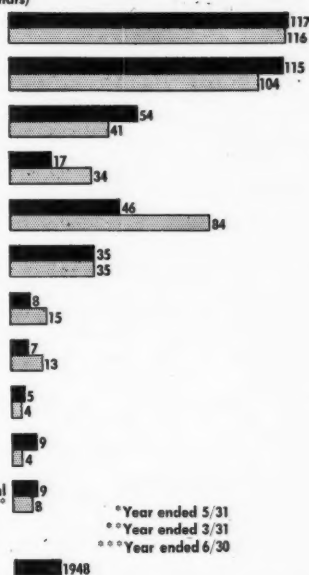
SALES

(Millions of Dollars)



CONSTRUCTION

(Millions of Dollars)



In the \$20-50 million sales range Mathieson, Penn Salt, Pfizer, and Commercial Solvents all increased expenditures and spent in excess of \$5 million each. Smaller increases were registered by American Agricultural and Harshaw. Mathieson expansion totaled \$15.8 million (31 per cent) partially as a result of its purchase of the WAA Lake Charles ammonia plant. Penn Salt showed the second largest increase, a jump from \$4.5 to \$7.5 million. Decreases were registered by Hooker and Atlas, with the largest decrease by Davison, which had purchased Florida mining properties in 1947 for \$4.6 million.

Further decreases in expenditures seem likely for 1949. Du Pont, Penn Salt, and Victor report substantial completion of their post-war programs. Carbide anticipates substantially lower expenditures and Pfizer a drop of \$1 million. Harshaw will defer expenditures where possible.

As in previous years, expenditures covered the purchase of government plants, as well as actual construction. In addition to Mathieson's purchase of the Lake Charles ammonia plant, American Cyanamid purchased the Fort Worth, Texas, oil-cracking catalyst plant for \$1.2 million, and Dow purchased the Ludington, Michigan, magnesium feed plant.

One of the year's most interesting developments was the acquisition of Westvaco by Food Machinery. Many of Westvaco's products were used by Food Machinery's customers. Also \$5 million was made available for Westvaco's western

phosphate expansion. Another interesting development was Heyden's purchase of the Rumford Chemical Co.

EFFICIENCY

With the return to a buyer's market numerous steps were taken in 1948 to improve efficiency, including the elimination of lines and the consolidation of operations as well as process improvements.

Three leading firms discontinued major operations in 1948. Celanese discontinued the manufacture of cellulose nitrate because of the limited future market outlook. Atlas discontinued the manufacture and sale of coated fabrics after recurring losses. Davison discontinued its Bridgeport, Conn., operation, dissolving the Berkshire Chemical Company.

Consolidations of operations were also numerous. Celanese transferred all its plastic molding material production to its Belvidere, N. J., plant. Libbey-Owens-Ford Plaskon division moved its Grasselli, N. J., operations to Toledo. Monsanto transferred its adhesives operations to its Springfield resins plant.

INTER-INDUSTRY COMPETITION

As in previous years there was strong chemical competition from firms in other industries, chemical expansions being made by oil companies, coke and pig iron companies, and distilleries as well as such firms as Celanese and Pittsburgh Plate Glass.

The most significant developments were

by Shell in the oil chemical field. In addition to completing the world's first synthetic glycerin plant and a large synthetic ethanol plant, Shell finished facilities for secondary butyl alcohol, methyl ethyl ketone, ethyl chloride, hexylene glycol, liquid propane, and lubricating oil additives, and expanded its capacity for ammonia, ammonium sulfate, and acetone. Shell research included intensive work on lubricants, synthetic detergents, and surface coatings.

Standard (Indiana), another active oil firm, formed the Indoil Chemical Company to handle its chemical activities.

In the coal tar field, Koppers completed large ethylene and polystyrene expansions at Kobuta, Pa., a sulfuric acid and cyanide plant at Kearny, New Jersey, and expanded its alkylation and sulfonation plants at Oil City and Petrolia, Pa. Koppers-Pittsburgh, formed with Pittsburgh Plate Glass, doubled its phthalic anhydride facilities. Another coal-tar firm, Pittsburgh Coke and Chemical, completed a phthalic anhydride plant, also a plant to formulate its own 2-4 D, DNOC, and parathion in agricultural chemical formulations.

National Distillers formed a wholly-owned subsidiary, National Distillers Chemical Corp., to construct a metallic sodium and chlorine plant at Ashtabula, Ohio, under DuPont licenses. Schenley research, devoted primarily to antibiotics, developed a commercial process for streptomycin.

Pittsburgh Plate Glass, nearing com-

pletion on a chlorobenzene plant, added caustic and chlorine facilities at Natrium, W. Va. Research included insecticides and herbicides with benzene hexachloride in pilot plant production.

Celanese, in addition to its cellulose and yarn activities, produced methylal commercially for the first time and made several other chemicals in development quantities. Its plastics activities included introduction of a flame-resistant cellulose acetate which received underwriters' approval.

AGRICULTURAL CHEMICALS

One of the outstanding developments of the year was the rapid expansion and intensification of activity in the field of insecticides and agricultural chemicals. DuPont, Allied, American Cyanamid, Hercules, USI, Hooker, and Pittsburgh Coke all reported expansions or new plants, and four additional firms, Monsanto, Commercial Solvents, Pittsburgh Plate Glass, and Shell, reported research activities or developments.

With regard to individual products, full-scale production of benzene hexachloride was reported by Hooker, pilot plant production by Pittsburgh Plate Glass, and the introduction of new forms by Commercial Solvents. Parathion is being produced commercially by American Cyanamid, and is one of Monsanto's new products; formulations are made by Pittsburgh Coke. Other products expanded or being developed were Toxaphene (Hercules), Pyrenone concentrates (USI), and 2-4-D and DNOC (Pittsburgh Coke).

There was also activity in the fertilizer field, with International Minerals completing two new plant-food mixing plants and Davison purchasing a Perry, Iowa, superphosphate and fertilizer plant.

PLASTICS

Plastics had another eventful year with new facilities and developments in almost all types.

There were expansions, including new plants, in nylon products, cellophane, polythene plastics, and acrylic resins by Du Pont, vinyl chloride by Monsanto, cellulose acetate by Hercules, polystyrene by Koppers, plastics materials and fabricating by Union Carbide, and resins by USI.

New developments included Celanese's flame-resistant cellulose acetate, a new heat-resistant polystyrene by Koppers, and the introduction of 25 new resins by USI. Union Carbide and Hercules also reported research in the plastics field.

In the closely allied field of synthetic rubber, the remarkable development of cold rubber, polymerized at low temperature, greatly strengthened the position of synthetic in its long-term battle with natural rubber. Production at government-owned plants of this rubber, which is

1947-1948 COMPARISONS					
Sales		(Millions of Dollars)	Construction		
1947	1948		1948	1947	
39.2	47.8	Pfizer	5.1	4.1	
41.1	43.1	American Agricultural*	1.9	1.7	
41.2	43.1	Atlas Powder	1.9	2.7	
54.9	41.5	Commercial Solvents	5.0	4.6	
32.0	36.0	Harshaw	2.0	1.4	
25.4	33.5	Davison*	2.1	6.2	
29.2	32.4	Penn Salt	7.5	4.6	
24.6	31.9	Mathieson	15.8	8.5	
20.2	23.7	Hooker**	3.3	4.7	

* Year ended 6/30.

** Year ended 11/30.

claimed to prolong tire wear 30 per cent, is being increased to 183,000 tons per year.

PHARMACEUTICALS

Nineteen hundred and forty-eight saw significant pharmaceutical developments in three fields: antibiotics, vitamins, and radioactive chemicals.

New antibiotics include American Cyanamid's aureomycin, highly specific for all pneumonias, undulant fever, and Q fever; Merck's dihydrostreptomycin, and Commercial Solvent's new forms of procain penicillin and bacitracin. In the field of antibiotics production, Commercial announced commercial production of bacitracin; Merck increased antibiotic facilities, and Pfizer, conversion and activation of the leased government Terre Haute plant. Schenley announced development of a commercial process for streptomycin.

In the field of vitamins, Merck announced the isolation of Vitamin B-12 from liver and authorized equipment for its manufacture. Nopco introduced a new soluble Vitamin A and D concentrate, and Commercial Solvents reported new forms of riboflavin.

In the field of radioactive chemicals, Abbott Laboratories offered the following in radioactive form for medical research and other purposes: colloidal gold, gold sodium thiosulfate, sodium phosphate, thiourea, pentothal sodium, and diiodofluorescein.

DETERGENTS AND SPECIALTIES

Among the specialty chemicals, detergents showed the greatest expansion. Monsanto completed a new plant for non-ionic detergents; Nopco produced several of the newer type detergents for the first time, and DuPont and Allied reported expansions, the latter in new detergents. Carbide listed wetting agents for textile dyeing and fire fighting among its new developments, and Monsanto introduced Duomerase. Detergents were one of Shell's fields of intensive research.

Another field showing great promise for the future is fluorine chemicals. Aided by declassified atomic energy information, this field is becoming active. Hooker introduced several fluorine compounds. Allied listed organic fluorine compounds as one of its new product additions. Penn

Salt is nearing completion on an HF and related products plant and emphasizing fluorine chemicals research. Harshaw also enlarged hydrofluoric production.

In the silicone field, Union Carbide began the manufacture of silanes, silicone raw materials; Dow-Corning introduced several new products, including silicone-treated papers for cleaning eye-glasses; USI reported application research.

Rubber chemicals and oil additives were objects of research, Pittsburgh Plate Glass reporting research on rubber reinforcing pigments, Monsanto on anti-oxidants and oil additives, and Shell on lubricants.

Other interesting new developments were Dow's styrene latex for paper coating, Hercules' new automatic sizing machine for the paper industry, and Monsanto's flame-resistant hydraulic fluid for aircraft.

ORGANIC CHEMICALS

Expansions were completed or underway in four of the most basic organic chemicals:

- 1) **Methanol:** DuPont, Allied, and Commercial Solvents (\$4.6 million Sterlington, La., plant completed).
- 2) **Formaldehyde:** Allied, Monsanto.
- 3) **Glycol and by-products:** Dow, Jefferson.
- 4) **Phthalic Anhydride:** Koppers-Pittsburgh (capacity doubled), Pittsburgh Coke and Chemical. The last two represent integrated operations from coking to final product.

Chlorinated hydrocarbon activities continued. Monsanto reported a chlorobenzene expansion, and Pittsburgh Plate Glass a chlorobenzene plant nearing completion. Hooker reported chlorinated hydrocarbons in pilot plant production and research on monochloroacetic acid derivatives. New York-Ohio Chemical completed its monochloroacetic plant.

In addition to the work of the oil companies, petroleum chemical research was reported by USI and Celanese.

INORGANIC CHEMICALS

As in 1947, chlorine and caustic soda were the most frequently mentioned inorganic chemicals. Expansions completed or underway included those of Dow (Canada), Monsanto, Hooker, Diamond Alkali, and Pittsburgh Plate Glass.

Ammonia was also expanded in 1948. In addition to Mathieson's purchase of the Lake Charles WAA plant, Shell further increased its capacity, and Hercules announced authorization of an ammonia and nitric acid expansion at Hercules, California.

Phosphorus and phosphate production was further developed. Monsanto opened its fifth phosphorus furnace, Westvaco began construction of its Pocatello, Idaho, elemental phosphorus plant, and International Minerals opened its new Noralyn,

Florida, phosphate mine and started plans for a new Tennessee phosphate plant.

Detailed summaries for individual firms follow.

E. I. DU PONT DE NEMOURS & CO.

Sales: \$969 million.
Expansion: \$116.7 million.
Facilities Expanded: Nylon products, poly-ethylene plastics, methanol, titanium pigments, acetate rayon yarn and staple, synthetic organic insecticides, "Monastrol" pigments, urea for use in plastics and agriculture, cellophane, synthetic detergents for textile and other industrial purposes, and acrylic resins for plastic molding compositions. Louisville, Kentucky, neoprene plant purchased from the government.

Construction Policy: Company's post-war construction program substantially completed. Accelerated depreciation used to compensate for high construction costs.

Research: Laboratory expansion program, postponed in 1947, reinstated. Completion will provide adequate facilities for present research staff of 1,800 technical employees. \$30 million enlargement underway at the Wilmington Experimental Station which will accommodate 2,500, including 900 technical personnel engaged exclusively in research, when expansion completed in 1950. Seventy-one fellowships totaling \$225,000 planned for 1949-1950. Grants-in-aid of fundamental research 1949-1950: \$100,000 plus \$20,000 membership in University of Chicago Institute for the Study of Metals.

UNION CARBIDE & CARBON CORP.

Sales: \$632 million.
Expansion: \$115 million. By divisions: alloys and metals, \$18.3 million; chemicals and batteries, \$79.3 million; electrodes, carbons, and batteries, \$4.4 million; industrial gases and carbide, \$12.8 million.

Facilities Expanded: Chemicals and Plastics raw materials expansions in Indiana, New York, Texas, and West Virginia. Plastics fabricating plant completed in Illinois. Additional plastic materials facilities in New Jersey and Ontario. Substantial expansion of Alloys and Metals in Indiana, Ohio, New York, and Alabama. New oxygen and acetylene units under construction in Arkansas, Illinois, Texas, Ohio, Montana, North Dakota, and Pennsylvania. Battery plants in Iowa and North Carolina completed. Expansion this year anticipated to be substantially lower than 1948.

Research: South Charleston, Carbide & Carbon research center scheduled for completion in Spring of 1949. Special emphasis on synthesis of organic chemicals, improved plastic products, metallurgy and use of electric furnace products, separating and treating atmospheric and hydrocarbon gases, and increased use of carbon as inert substance. Operation of Oak Ridge and other contributions to atomic research and development. Recent developments: wetting agents for textile dyeing and fire fighting; silanes, silicone raw materials.

ALLIED CHEMICAL AND DYE CORP.

Sales: \$388 million.
Expansion: \$54.2 million.
Expanded Facilities: Include facilities completed or nearing completion for products not heretofore manufactured: methanol, formaldehyde, organic fluorine compounds, anti-skinning agents for paints, and new detergents, insecticides, and dyestuffs.

Construction Policy: \$4.8 million added to reserves for accelerated depreciation on post-war additions.

AMERICAN CYANAMID CO.

Sales: \$232 million.
Expansion: \$17.2 million (5-year total, \$97.7 million.)

Expanded Facilities: Thiophos parathion insecticide now in commercial production. Fort Worth, Texas, oil-cracking catalyst plant purchased from government for \$1.2 million. Jefferson Chemical (equally-owned with Texas Co.) began operation of its Port Neches ethylene dichloride, ethylene glycol, and ethylene oxide plant.

Research: \$10.5 million. Introduced aureomycin, new highly specific antibiotic for pneumonias, undulant fever, Q fever, and other diseases.

DOW CHEMICAL CO.

(Year ended May 31, 1948)

Sales: \$171 million.
Expansion: \$46.3 million.
Facilities: WAA magnesium feed plant at Ludington, Michigan, purchased 12-31-47. Glycol and glycol by-products plant, shops, and offices completed at Sarnia. Caustic-chlorine plant under construction there.

New Products: Styrene Latex 512, a paper coating. New silicone products including silicone treated tissues for cleaning eye glasses (Dow-Corning).

MONSANTO CHEMICAL CO.

Sales: \$162 million.
Expansion: \$35.2 million (including \$9.6 million at Texas City).

Facilities Expanded: New elemental phosphorus furnace finished at Monsanto, Tennessee. New plants completed for: non-ionic synthetic detergents at Trenton, Michigan; vinyl chloride resins and formaldehyde at Springfield, Mass.; a fire resistant plasticizer at St. Louis, Mo.; Stymer synthetic textile sizing agent and Syton textile spinning agent at Everett, Mass. Expansions included phosphates at Trenton, and chlorine, caustic, phenol, and chlorobenzene at Monsanto, Illinois. Production of glues and wood preservatives moved to a new plant in Seattle. Lockport adhesives operation transferred to Springfield.

Research: New products: Nirax, insecticide; Skydrol, non-inflammable hydraulic fluid developed with Douglas Aircraft; Santowite, non-discoloring rubber anti-oxidant; Duomerase, new synthetic detergent; and Utraol, new rain, stain-, and fire-resistant fabric coating. Studies underway on promising new oil chemicals, anti-oxidants, and pour-point depressants, new insecticides, and styrene copolymers.

Atomic Energy: Newly completed Mound Laboratory, Miamisburg, Ohio, in full operation for AEC. Site northeast of Marion, Ohio, selected for new AEC installation.

HERCULES POWDER CO.

Sales: \$129 million.

Expansion: \$7.6 million.
Facilities Expanded: Cellulose acetate expansion completed. Two CMC (cellulose gum) additions authorized. Anhydrous ammonia and ammonia oxidation expansions approved at Hercules, California. New contract to move government Louisiana, Mo., ammonia trains to San Jacinto Ordnance Depot and operate them there. Toxaphene plant completed early 1948; capacity now being doubled. Rosin amine unit under construction. Abitol, an alcohol for synthetic resins, unit completed in early 1948.

Research: \$3.9 million. Field work on toxaphene control broadened. New high rosin content paste size and automatic sizing machine developed. Application research on Pentaltyn and other synthetic resins with progress on use in printing ink, floor covering, and oil additive fields.

AIR REDUCTION CO.

Sales: \$94.9 million.

Expansion: \$6.6 million.
Research: The experimental low-purity tonnage oxygen plant at Bethlehem's Johnstown Works began operations in October.

U. S. INDUSTRIAL CHEMICALS, INC.

(Year ended March 31, 1948)

Sales: \$73.3 million.
Expansion: \$5.29 million.

Facilities Expanded: Two 1.8 million gallon tankers purchased for \$1.9 million. Sixty per cent of remainder for completion of power and dry ice plants at Baltimore, continued construction of the new Newark resin plant, expansion of insecticides production and control lab at Bayonne, and erection of resins and higher alcohol pilot plants at Baltimore.

Construction Policy: \$7 million expenditure anticipated during current fiscal year.

Research: Approximately \$1.5 million. Emphasis on water-soluble chemicals from hydrocarbon synthesis plants, organic intermediates, amino acids, synthetic insecticides, coating vehicles, silicone applications, thermosetting resin exploration, new plasticizers, Pyrenone insecticide applications, and new fermentation processes for chemicals other than ethanol and butanol. More than 25 new resins introduced commercially.

MERCK & CO.

Sales: \$72.9 million.
Expansion: \$9.3 million (1947 plant \$27.0 million.)

Facilities Expanded: Larger antibiotic facilities nearing completion. Equipment for Vitamin B-12 authorized. New miscellaneous organics building and pilot plant additions under construction at Rahway. New buildings at Valleveld, P. O., nearing completion. St. Louis branch office and warehouse to be completed this fall. Commercial production of sulfanoxaline, veterinary product, begun. Penicillin and streptomycin licensing agreements in England, France. Technical assistance for construction penicillin plant in U. S. Zone of Germany.

Research: \$4,270,000. Important addition to research and development laboratories completed. Further addition authorized late in 1948. Additional building for Merck Institute for Therapeutic Research nearing completion. Crystalline vitamin B-12, isolated from liver, and now being marketed. Dihydrostreptomycin, which has advantages over streptomycin, introduced latter part of year. \$50,000 Canadian fellowship program established to be administered by National Research Council of Canada.

INTERNATIONAL MINERALS & CHEMICAL CORP.

(Year ended June 30)

Sales: \$50.1 million.
Expansion: \$9.3 million.

Expanded Facilities: Completed: The San Jose, California, Amino Products plant; the new Noralyn, Florida, phosphate mine; sulfuric acid plants at Lockland, Ohio, and Spartanburg, S. C., and two new plant food mixing plants. Under construction: a potassium chloride and potassium sulfate plant at Carlsbad, New Mexico; new phosphate drying facilities at Noralyn; and added Multiphos facilities at Wales, Tenn. In active planning: a new Tennessee phosphate plant.

Research: New central research lab now being designed for Chicago area. Research emphasis on amino acids and sodium glutamate. New phosphate and phosphoric acid processes developed. Studies on high grade calcium phosphate minerals for animal feed.

CHARLES PFIZER & CO.

Sales: \$47.8 million.
Expansion: \$5.06 million.

Expanded Facilities: Groton, Conn., water and steam facilities and citric acid plant completed; oxalic acid plant completed January, 1949. Terre Haute plant leased from government, activated and converted.

Construction Policy: 1949 expenditures not expected to exceed \$4 million.

Research: Brooklyn research laboratories considerably expanded. Process development building under construction. Research staff expanded in both antibiotics and organic synthesis. Thousands of organisms being tested.

AMERICAN AGRICULTURAL CHEMICAL CO.

(Year ended June 30)

Sales: \$43.1 million.
Expansion: \$1.9 million.

ATLAS POWDER CO.

Sales: \$43.1 million.
Expansion: \$1.9 million.

Expanded Facilities: New plant completed at Atlas Point for manufacture of sorbitol esterification products and other organics for food and pharmaceutical industries. Activated carbon expansion at Marshall, Texas, by Darco subsidiary nearing completion. Stamford, Conn., coated fabrics operations closed and liquidated.

Research: \$855,000. New pilot plant in first full year's operation.

COMMERCIAL SOLVENTS CORP.

Sales: \$41.5 million.
Expansion: \$5.0 million.

Facilities Expanded: \$4.6 million Sterlington, La., 45,000 gal/day methanol plant completed. New products placed in production: dibutyl maleate, diethyl maleate, benzyltrimethyl ammonium chloride, and a new more soluble type of riboflavin. Bacitracin placed in commercial production.

Research: \$1.8 million. \$2 million laboratory expansion nearing completion. New products include chlorine bicarbonate and new forms of benzene hexachloride, procaine penicillin, bacitracin, riboflavin, and a new fungicide.

HARSHAW CHEMICAL CO.

Sales: \$36.0 million.
Expansion: \$2 million.

Facilities Expanded: First step in Gloucester City, N. J., program completed. New installation for synthetic optical crystals at El-Ria. Expansion of nickel salts, hydrofluoric acid and related compounds at Harvard-Denison plant. New York-Ohio Chemical completed monochloro production of COCS, copper fungicide, at Calumet, Michigan. Nyotex increased aluminum chloride facilities.

Research: Cleveland research laboratories completed.

DAVISON CHEMICAL CORP.

(Year ended June 30)

Sales: \$33.5 million.
Expansion: \$2.08 million.

Facilities Expanded: Perry, Iowa, superphosphate and fertilizer plant purchased. Bridgeport, Conn., operation discontinued and Berkshire Chemical being dissolved.

Research: \$534,000. Staff and total expenditures to be increased further in current fiscal year.

PENNSYLVANIA SALT MFG. CO.

Sales: \$32.4 million.
Expansion: \$7,480,000.

Facilities Expanded: At Wyandotte, ammonium chloride plant completed, and high-test bleaching powder, caustic finishing, and liquid ferric chloride capacity increased. New Cal-

(Turn to page 863)

How to Follow-Up SAMPLES

by J. R. SCHACHT and E. H. RIDDLE
Rohm & Haas Co., Philadelphia, Pa.

SENDING OUT SAMPLES is a waste of time, money and effort unless an adequate follow-up system is employed. The follow-up itself, on the other hand, can become too expensive. Here's how one company strikes an effective balance and gets results.

SEND FOR a free sample is the inevitable punch line in any campaign designed to promote sales of chemical products to new users, whether a standard product or a development product is involved. Until a customer has examined the product and satisfied himself regarding its utility, the possibility of worth-while sales is extremely remote indeed. Both advertising and direct customer calls, therefore, have as their first objective getting a sample in the hands of the interested party.

It is an easy matter, therefore, to become "sample happy", and to distribute samples, more or less indiscriminately, all over the country. What happens then? If the sample is not adequately followed up, a great deal of time, money, and effort will be wasted. In many cases, a negative response is often as valuable as a positive one; but we can hardly assume, because a user was not heard from after receiving a sample, that the material was worthless or he had no further interest in it or a similar product. In addition, we have, of course, no indication as to why the material was not pursued further.

PERSONAL CALLS IMPRACTICAL

A personal call is naturally the most satisfying way to follow-up a sample. However, considerations of subject matter, economy, and geography simply make it impossible to follow-up personally every sample which is sent out. In our own company, for example, we are sending samples out to somewhere between 3,000 and 4,000 inquirers per month. We have over 100 field salesmen, whose work is supplemented (in the case of development products) by a staff of office men who visit the field from time to time. If all samples were followed up personally, each of these men would spend anywhere from one-third to one-half of his time in the effort; and all of our people have either sales or office duties in connection with established business which make this impossible.

It is also apparent that many accounts

do not warrant personal calls until there is some evidence of interest other than in their request for a sample. This may be because of the size of the account, or because (as in the case of universities), theoretical work is being carried out without immediate commercial implications. Nevertheless, information from these sources is very desirable indeed.

The obvious answer is an adequate sample follow-up system. We have gone through an interesting evolution in the matter of follow-ups and also in a method of recording data received as a result of these follow-ups, as well as those from direct calls. We feel that our experience may be of interest to others who have similar problems.

The Special Products Department of Rohm & Haas Company, which developed

the system described here, is a rather compact group engaged largely in sales development work in behalf of new products, and exploratory work in search of new fields of application for established products. As such, it has a particular interest in a good record and follow-up system, and is in a good position to try out various techniques. Our experience is now being adopted, with appropriate modification, in our other divisions.

POSTCARD TOO PUBLIC

Originally, we used a return double postcard, with space for description of the problem and results of the evaluation. This card had been used with some success elsewhere in the company. However, criticisms of the postcard—principally lack of "privacy" in sending the return card and lack of sufficient space for comments—led us to send out a questionnaire to 200 people to whom we had been sending these cards. One hundred of these people had been returning the cards regularly, and the other 100 had not returned them at all. We were pleased, and sur-

Fig. 1—"Memo" asks sample recipient for his results. Failure to answer evokes a follow-up.

prised, to have 62.5% of these questionnaires returned to us, many with additional comments and suggestions. Moreover, the replies were about evenly divided between the two groups on the mailing list. We believe that this response indicates a general interest in this problem among those people receiving samples.

As a result of this questionnaire, we completely redesigned the forms, while retaining the same general scheme. We now have a green "memo" form which is $8\frac{1}{2} \times 7$ " in size. To this is attached a white $8\frac{1}{2} \times 11$ " sheet. The green memo (Fig. 1) gives the name and address of the person to whom the sample was sent, the reference to his original request (order number or date of his letter), and the name of the product or products sampled. The white sheet (Fig. 2) is an exact duplicate of the green memo at the top, and when the above information is typed on the green page, it is duplicated with carbon paper on the white page. Two-thirds of the white sheet is available for description of the problem and for reporting results and comments, thus allowing ample room for the report.

The essence of this system, therefore, is its simplicity for the person who received the sample. All he has to do is write out his report on the white sheet, either long-hand or typed if he wishes, and put it in the return envelope. The green memo form can be kept in his files to serve as a record of the sample he has reported on. If he wishes to have a copy of the report itself, it is a simple matter to make a carbon copy (which could not be done easily with the original follow-up card we used).

SECOND FOLLOW-UP

If the follow-up report has not been returned after a two-month period, another form is sent. This has the same format, with the green memo and white sheets as before. Only the message on the green memo is changed, and it now reads:

SUBJECT: SAMPLE REPORT

Some time ago we inquired about your results with material we had sent you. Since we haven't heard from you, we have assumed your work is still in progress.

We are quite interested in learning whether our material was useful. If it did not give the desired results, we are anxious to learn why, as this will help us in the search for a more suitable material to solve your problem.

Won't you take a minute or two to complete the attached report?

Thanks a lot!

We are currently receiving returns of the first follow-up at the rate of about 40% and of the second follow-up at the rate of 20%. Through the two follow-

Fig. 2—Sheet accompanying "memo" provides space for recipient to jot down results, comments.

ups, we ultimately get returns on over 50 out of every 100 samples we follow-up by mail. It is true that many of these returns consist of a statement that the project is confidential and no report can be given. In other cases, we get a brief statement to the effect that the material has been evaluated and is not of interest, without any indications of the problem or the shortcomings.

However, we receive a fairly high percentage of detailed reports, which give the problem, the results of tests, and an indication of further interest. We have found that the letter-head size form is giving us much better information than the postcard—possibly because it is more confidential than a postcard, and also because it gives more room for comment. Many of these reports are invaluable in determining both the desirability of personal follow-ups and the over-all progress we are making in behalf of a particular product or application.

Next question: What to do with reports obtained on samples, either by personal call or by mail? They can be put into a subject file, but with the nearly 100 different products that the Special Products Department handles, this can become very cumbersome, with the at-

tendant difficulties of cross-references typical of any filing system of this type.

PUNCH CARD SYSTEM

This problem, as well as others involved in recording samples, has been solved by the use of McBee Keysort punch cards. On the face of the card is recorded the name and address of the company, the name of the individual receiving the sample (or the order no., if sent through the purchasing dept.), the name of the product sampled, the date it was sent, and the quantity supplied. The follow-up reports are typed on the back of the card as they are received; or if the report is lengthy, it is abstracted with a reference to the original, which is filed in a customer file arranged geographically.

It is not the purpose of this article to describe in detail the mechanics of the Keysort punch card system. This is adequately described elsewhere, and the manufacturer of these cards can be of considerable assistance in this connection. Our purpose is only to describe our method of using these cards. Our punch card contains four codes: product, geographical, field, and alphabetical, as shown in the illustration in Figure 3.

The product classification, employing two rows of holes on the top and bottom of the card, is a direct code with each of the 116 holes designating a separate product or product grade. (It is necessary to use a direct code, rather than an indirect code such as the 7-4-2-1-0 system, since it is desired to list any of the 116 products on any one card.) This code permits easy separation of the cards on which samples of any desired product are listed. This is useful for mailing-list purposes, such as when a price change is made, new literature becomes available, or the status of the product changes. It is also useful when it is desired to write an annual report or to summarize the status of a development product, since all the follow-up reports are recorded on the back of the cards.

GEOGRAPHICAL SORTING

The geographical classification involves a selective sorting code, utilizing the indirect coding system 7-4-2-1-0 whereby numbers 3, 5, 6, 8 and 9 are coded by slotting combinations of the 7-4-2-1-0 holes. In this manner, a total of 99 numbers may be coded with 10 holes (one set of 5 for each digit.) Consequently, we have divided the United States into 99 geographical subdivisions, involving all of the major city areas where there is a significant amount of chemical industry by marking suitable boundaries on the state maps. Ohio, for instance, is divided into Cleveland, Columbus, Cincinnati, Dayton, Toledo, and Miscellaneous Ohio. Moreover some of these city designations include suburban areas

which are within easy traveling distance of the center of the city by automobile or public transportation. Chicago, for example, includes the section from Waukegan, Illinois, to Hammond, Indiana.

Since this geographical code is set up for selective sorting, all the companies in any one city or area may be separated with one sorting operation. Thus, if a trip is to be taken to Chicago, all of the Chicago cards can be pulled out for perusal. Alternatively, the cards can be sequence sorted, which will arrange them in groups of the same geographical identity, if it is desired to compare the advisability of making trips to the various locations. If the calls are made through field salesmen, this type of code can be supplemented or substituted by a salesman's code.

The field code is used to designate broad groups of products—in our case, surface-active agents, inorganic chemicals, organic chemicals, and enzymes. By means of this code, which uses a direct sort, the companies who have had samples of organic chemicals can be separated from those that have not. This is helpful in our case because each man in the Special Products Department is primarily concerned with one of the above groups of products.

MULTIPLE SELECTION

Additional specificity in sorting the cards can be obtained by combining two or more of these codes in the sorting operation. In other words, two sortings (one in the geographical code, and one in the field code) will produce all the cards on

which samples of organic chemicals in the Chicago area are recorded. Getting even more specific, all the cards on which are recorded samples of a specific organic chemical, such as octylphenol, in the Chicago area, may be separated by sorting the geographical code and the product code successively (these could be sorted in *one* operation if they were on the same side of the card).

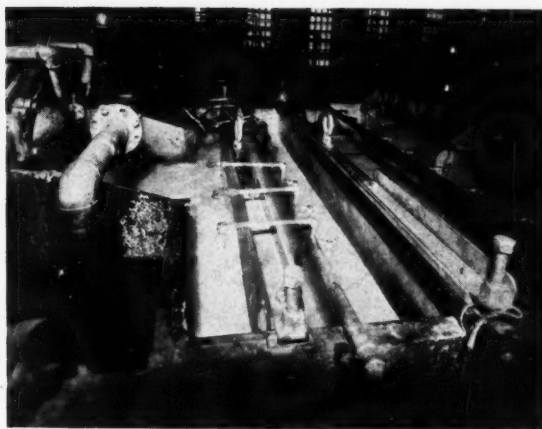
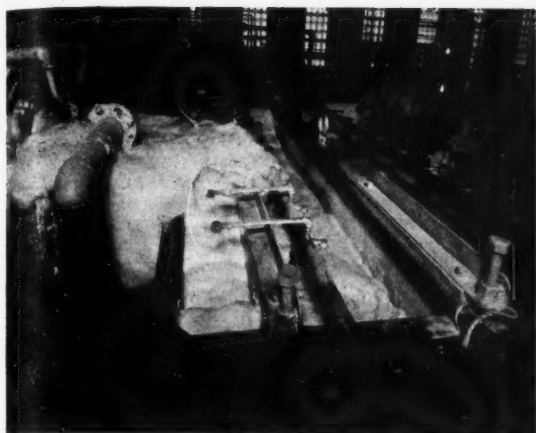
Finally, we come to the alphabetical code. The cards are filed alphabetically by company. This has to be done in order to locate quickly the card for each company to add additional samples or record follow-up information. It is not feasible to use the sorting operation to locate only one card. The alphabetical code is used, however, for putting the cards back into alphabetical order if they get out of order during use. If there are only a few cards out of the file or out of order, manual filing is simpler than sorting, and the latter is used only when a very large percentage of the cards is no longer in alphabetical order. A technique of dropping the cards only part way out when sorting, instead of separating them entirely, saves refiling and is satisfactory for some uses such as making up a mailing list.

There are additional or alternate types of classifications for which these cards are admirably suited, depending upon the needs of the individual company or department. We have adopted the same card (as far as the codes are concerned) for use in recording regular sales, as shown in Figure 3. This is particularly useful in sales development work because the recording of a large number of small quantity sales, e.g., 5-10 gallons, can be handled without difficulty, and it is these small sales, representing in most cases development work on the part of the customer, that are of most significance to a sales development department.

The principal virtue of the punch card system is the fact that, with only one typing of the information, *more than one* kind of information is made available through sorting of the cards. It is often asked how the Keysort system compares with the IBM type of mechanical punching and sorting. It is our opinion that these systems are complementary rather than competitive. For an overall analysis of sales records, for instance, the IBM punch cards are undoubtedly superior to Keysort. On the other hand, for selecting information from a file, the Keysort system, with its greater simplicity, involves considerably less work and less equipment than the use of IBM punch cards.

We would be the last ones to claim that we have solved all the mechanical problems of sampling and follow-ups with these techniques. However, they have proved useful and seem to be a good starting point.

Fig. 3—Punch card for office use allows breakdown of sample requests into product class, specific product, and geographical area. Follow-up reports are recorded on backs of cards.



Obstinate foam in head-box of paper making machine controlled by adding Nopco KF defoaming agent to suction side of fan pump.

Chemical Antifoaming Agents

By SYDNEY ROSS
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SYNTHETIC SURFACE-ACTIVE chemicals have largely replaced natural materials for foam control. So effective that trace quantities are often suitable, they find a wide variety of process applications.

UNTIL recently the foaming problem in many industries was combated by traditional remedies: Foaming of boiler waters was prevented by addition of small quantities of castor oil; frothing of paper pulp suspensions, by addition of various mineral, vegetable or animal oils; and foaming of boiling sugar-beet runoffs, by addition of linseed oil. These are three of the chief places where foaming causes process headaches; other industries faced with the same problem arrived at similar solutions.

Within the last few years the synthesis of a number of surface-active agents has made possible a superior approach to the problem. A study of those materials that have proved themselves traditionally to be of use has led to isolation of some of the molecular structural factors that give them the desired properties. With these clues, materials which greatly surpassed the original, traditional remedies were soon synthesized. At present, various chemical manufacturers sell antifoaming agents specifically designed for their intended use in industry—materials so effective that in many applications only a trace quantity (such as 0.001 per cent) is required.

Another advantage of these modern antifoaming agents has also begun to appear. Formerly every foaming problem had to be dealt with as a specific and isolated situation. Frequently the remedy

that worked for a certain industrial problem would not work when the conditions were only slightly altered. Modern antifoaming agents, on the other hand, are capable of a wide and useful range of application. While it is true that no universal defoaming agent has yet been made or is likely to be developed, the new agents have shown themselves able to control foaming in a greater variety of applications than any of the older materials.

FOAM INHIBITION

The theory of foam inhibition traces the ability of a chemical to act as a defoaming agent to its spreading property with respect to the foaming liquid. This theory applies only to insoluble defoaming agents, but that is not a great restriction as most of the successful agents are insoluble in the foaming system. The spreading coefficient, S , is defined as

$$S = \gamma_F - \gamma_{F^1D^1} - \gamma_D$$

where γ_F is the surface tension of the foaming liquid, $\gamma_{F^1D^1}$ is the interfacial tension at the defoaming agent/foaming liquid interface, and γ_D is the surface tension of the defoaming agent.

If S is positive, the agent will spread on the surface of the bubbles and ultimately cause the bubbles to break. If S is negative, the agent will not spread and the foam will remain stable.

The importance of the new synthetic

surface-active agents that are able to spread on either aqueous or oily surfaces is immediately obvious. The older antifoaming agents occurred naturally and were the only ones available. Modern, synthetic agents have now almost entirely displaced pine oil, castor oil, linseed oil and similar materials, themselves surface-active though to a lesser extent. In current industrial practice nearly every type of surface-active chemical is employed at one place or another as an antifoaming agent.

CHEMICAL TYPES

1. *Alcohols.* One of the earliest chemical defoamers is 2-ethyl hexanol, frequently referred to simply as octyl alcohol. It is still a widely used defoaming agent in many industries, such as beet sugar production, paper, textile printing, glue spreading and as a general defoamer for soap solutions and in analytical procedures.

Another alcohol that is now successfully competing with 2-ethyl hexanol is di-isobutyl carbinol (Carbide and Carbon Chemicals Corp.). This material is usually equally as effective as 2-ethyl hexanol and is cheaper. In some applications a mixture of these two alcohols is more effective than either one alone (synergistic effect). Di-isobutyl alcohol is now sold in greater amount as a defoaming agent than is 2-ethyl hexanol. Important applications are in the neutralization of waste H_2SO_4 with $CaCO_3$, the paper industry, printing inks and glues. It has another advantage in some systems: the persistence of the defoaming effect is notably long, sometimes for

days. The persistency of any agent varies with the system and the temperature of operation. In general, all chemical defoamers become inoperative after a time. When choosing a suitable chemical defoamer it is usually necessary to consider cost, concentration and persistency.

Other alcohols also used as chemical defoamers are amyl alcohol, caprylic alcohol, 2,6,8-trimethyl nonanol-4, tetradecanol and trimethylcyclohexanol (Carbide and Carbon Chemicals Corp.). In general the higher alcohols are insoluble in water and have low surface tensions and so would appear *a priori* to be suitable antifoaming agents.

The higher polymerized glycols have been found to be useful in preventing foaming of boiler waters in steam generation. They are sold under the trade-name of Ucon Brand Fluids (Carbide and Carbon Chemicals Corp.). Here again synergistic effects have been observed. Ucon Brand Fluid and heptanol-3 have been found more effective than either agent alone in the defoaming of soap solutions, for example.

2. Fatty Acids and Fatty Acid Esters. Both naturally occurring fats and fatty acids are often sold as foam inhibitors. Nopco Vegifat Y (Nopco Chemical Co.), composed primarily of a mixture of long and short chain fatty acids, has been found useful for preventing foam in fermentation processes, yeast manufacture and penicillin production.

The specific advantage of the fatty acid esters is that many of them are non-toxic and so can be used as antifoaming agents in food manufacture. Soan 20 (sorbitan monolaurate), Span 85 (sorbitan trioleate) and Tween 20 (polyoxyethylene sorbitan monolaurate), all produced by Atlas Powder Co., have found widespread acceptance in this field. Following are a few specific applications which illustrate their present use.

During the evaporation of aqueous milk sugar solutions, it is desirable to reduce the copious foam that usually forms. Span 20, up to about 0.05% of the finished milk sugar, is effective.

The control of foam during the evaporation step in the concentration of molasses is of paramount importance. This foaming is effectively controlled by the use of 0.002% Span 20.

Finished yeast tablets are prepared from bulk yeast usually supplied by brewers. During the processing and handling, the yeast must be pumped, pressed, and subjected to an evaporation process, all of which tend to produce foam. Span 85 has been found to be a useful antifoaming agent. A typical example of this use of Span 85 is the incorporation of one pint of Span 85 in 1000 gallons of yeast slurry to decrease foam effectively and speed processing.

Other examples of the industrial uses of these esters are in cooking of soybean

casein and glue. Soybean casein finds many industrial applications that require aqueous dispersions, which are subject to foaming. Span 85 at 5 parts per million is an effective antifoaming agent in most of these applications. The foaming that usually appears in cooking or evaporating large batches of glue, can be effectively reduced with 0.0025% Span 85.

Foaming occurs in phosphoric acid production during the digestion of calcium polyphosphate in strong hot phosphoric acid. In striving for shorter digestion periods and hence more rapid chemical activity, copious foam results. It was found that 20 to 40 c.c. of Span 20 considerably reduced the foam resulting from 1,300 pounds of acid.

Glyceride esters have also been found useful as antifoaming agents. The Nopco Chemical Co. has developed a number of formulas especially for use in the paper and textile industries. Nopco KF (U.S. 2,304,304) is a mixture of wax and partial glycerides which is applied in emulsion form at various stages of the pulp and paper making process. The amount used varies slightly with the individual mill conditions, but usually about 0.1% based on the dry weight of the wood pulp is enough to improve the flow characteristics of the fiber slurry, which results in greatly improved sheet appearance. When one considers that the concentration of pulp in water at the beater is about 3%, it is clear that the required quantity of antifoam is very little.

Another similar type of antifoam manufactured by the Nopco Chemical Co. is Nopco 1907, designed for foam inhibition of animal glues. If glue is used only in small amounts and applied by hand, the presence of foam is not objectionable, but if used in large amounts and applied by machinery, its presence is very troublesome.

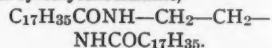
The fatty acid esters of glycols and polymerized glycols are also patented as antifoaming agents for glue solutions, paper-pulp suspensions, fermentation masses and starch pastes, to inhibit foam during processing and during evaporation (U.S. 2,390,212 to Nopco Chemical Co.).

3. Amides of Fatty Acids. The fatty acid amides, such as stearamide, were first used as antifoaming agents in the treatment of boiler waters to prevent or retard priming or frothing (U.S. 1,892,857).

As well as in the treatment of boiler waters, amides of fatty acids have been prepared for use as foam breakers on the surface of paper stock, glue, starch, casein solutions and other proteinaceous solutions. A cationic surface-active agent is prepared by the reaction of oleic acid with diethylene triamine, oleic acid with ethylene diamine, rice oil with diethylene triamine, soybean oil with diethylene triamine, etc. These compounds are patented by the Nopco Chemical Co. as antifoaming agents (U.S. 2,347,178).

Both polyamine and polyamide derivatives have been found to be highly effective antifoaming agents for water during steam generation. The mechanism of foam inhibition is certainly not the same in a boiler as it is for an ordinary foaming liquid at room temperature, and it is quite probable that surface tension measurements made at room temperature would not relate to the conditions inside a steam boiler.

Among the several types of new chemical compounds having outstanding merit as antifoams in the treatment of boiler water are the alkylene polyamides; the simplest of the more effective ones is distearoyl ethylenediamine,



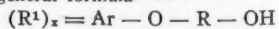
The antifoam materials are usually supplied, however, not as single pure compounds, but as mixtures of higher molecular weight polyamides and polyamide derivatives, in which form they are found to be most versatile and most effective. They are available as Anti-Foam 666, 669 and several other formulae from the Dearborn Chemical Co. The latter formula is especially recommended for power plant boiler applications. (U.S. Reissue 23,085 and U.S. 2,461,730).

The high melting polyamides are designed for use in high-pressure steam boilers, whereas the low melting polyamides and various polyamide derivatives are available for foam inhibition in evaporators and aqueous systems operating at atmospheric conditions or at relatively low temperatures and low pressures. The latter materials are suitable for use in the textile industry, the paper industry, in detergency applications, in automotive cooling systems and in general for various foaming problems in process industries. Dearborn Formula No. 666 is representative of a group of formulae that have been found useful in such industries. As with all antifoaming agents tests alone can establish their relative utility for a given application.

The aliphatic thioamides have been patented by Armour and Co. as antifoaming agents (U.S. 2,168,847).

4. Ethers. 1,3-Glycols or their hydroxyalkyl ethers are used as foam inhibitors. The latter are obtained as products of the action of alkylene oxides on 1,3-glycols (Ger. 704,862).

H. E. Tremain and L. R. Bacon (U.S. 2,453,352 to Wyandotte Chemicals Corp.) have discovered superior foam inhibiting properties in the ethers corresponding to the general formula



where R and R¹ are alkyl radicals, Ar is an aromatic hydrocarbon of the benzene series, x = 1 or greater whole number. Examples of compounds coming within this general chemical formula are: di-tertiary amyl phenoxyethanol, p-tertiary amyl phenoxyethanol, di-tertiary amyl

phenoxy propanol and di-tertiary amyl phenoxy isopropanol.

Di-tertiary amyl phenoxyethanol is the active foam-inhibiting agent in two preparations sold by Wyandotte Chemicals Corp. and designated by the trade names Foamicide L and Foamicide A (U.S. 2,407,589).

The following list of industries, while by no means complete, may be considered typical of those in which the Foamicides have been found useful: washing or cleaning machines of all types using alkalies, phosphates, silicates, soaps or wetting agent solution; textile plants and textile operations, mercerization baths, sizing, kier boiling and dyeing operations; pulp and paper plants; chemical and dye-stuff plants; glue and casein plants; paper coating mills; power plant boilers; canneries; tanneries; sewage disposal plants.

Generally speaking it is difficult to predict the action of any antifoaming agent in a new system and it is usual to recommend that some arbitrary minimum amount be used initially and increments added until the desired suppression is effected. Thus it has been found in practice that 0.025% of a Foamicide is a reasonable starting amount. Some cases were encountered where excessive foaming was causing difficulties, which were brought under control by the use of as little as 10 to 15 parts per million of Foamicide. In other systems, for reasons not known, amounts up to 0.25% did not bring about satisfactory control.

Foamicide L cannot be considered safe for use in any process where it is actually added to a food or beverage for human consumption, such as any process where the product is not separated by distillation. However, used as directed for controlling foam in bottle washing machines, it is very unlikely that a harmful degree of contamination would ever occur.

5. Organic Phosphates. Many organic phosphates, such as trioctyl phosphate and other esters of phosphoric acid, have been recommended as antifoaming agents (Brit. 526,690; Ger. 724,755; U.S. 2,407,589). Trioctyl phosphate is commercially available from Carbide and Carbon Chemicals Corp. under the trade name Flexol Plasticizer TOF. The Victor Chemical Works has developed the use of sodium octyl phosphate as an antifoaming agent in industrial cleaners.

In the general field of foam control there are a number of surface-active agents that combine efficient wetting or detergency with freedom from foaming tendencies. The anionic wetting agent Victawet 35B, $\text{Na}_5\text{R}_5(\text{P}_3\text{O}_{10})_2$, where R is 2-ethylhexyl, is a water-soluble, non-foaming wetting agent. The non-ionic Victawet 12, medium chain alkyl group— $\text{O}-\text{P}(\text{OR})_2=\text{O}$, where R is a water solubilizing group, is another non-foaming wetting agent, effective in both acid and alkaline solutions.

In this connection it is worth mentioning some other commercially available detergents and wetting agents that are relatively non-foaming. They are applicable for use in automatic washing machines where there is considerable agitation of the detergent solution, and where an ordinary detergent plus an antifoaming agents is more expensive or less effective than a single non-foaming detergent. Monsanto Chemical Co. markets a non-ionic non-foaming detergent, Sterox. Atlas Powder Co. markets polyoxyethylene esters of mixed fatty and resin acids under the trade name Renex. When used in conjunction with foaming type detergents such as the alkyl aryl sulphonates, Renex at concentrations equal to 18% of the alkyl aryl sulphonate used, increases the detergency about 30% and reduces the foaming qualities of the mixture. Victor Chemical Works offers an organic non-ionic, non-foaming, built detergent for these uses—Detergent T12X.

6. Metallic Soaps of Fatty Acids. Some metallic soaps have been mentioned as antifoaming agents for lubricating oils in aircraft engines. Copper palmitate and lead palmitate were both effective at room temperature, but only lead palmitate remained effective at 100° C. (N.A.C.A. Wartime Report, ARR No. 4105).

Aluminum stearate is one of the ingredients of the Nopco Chemical Co.'s antifoams sold as Nopco 1333, Nopco 1497 and Nopco 1497B. They are used to defoam animal glues and in the textile industry, particularly in the warp sizing operation. Here Nopco 1497B has shown great effectiveness against the foaming tendencies of the proteinaceous materials usually employed as one of the constituents of the warp size. A concentration of less than 0.5% of Nopco 1497B is effective. Nopco 1497B is also effective as a constituent in the preparation of defoamed glue stock, and here also a concentration of 0.5% is recommended.

It seems probable in view of the known properties of many of the metallic soaps of fatty acids that hydrolysis of the material often takes place under the conditions of use, especially where both water and a good solvent for the fatty acid product of hydrolysis are present together. The defoaming action in such cases may be caused by the free fatty acid rather than by the metallic soap.

7. Silicones. Perhaps the most versatile of all antifoaming agents are the recently developed silicones, sold as DC Antifoam A by the Dow Corning Corp. and as Anti-Foam 81066 by the General Electric Co. A partial list of applications for these silicone agents includes: adhesives; analytical determinations; asphalt and tars; distillation of alcohols;

formaldehyde from protein solutions; processing of beet sugar, chewing gum, flavors, molasses, peaches, skim-milk, soft drinks, tallow, whiskey, wine, yeast; perfume solubilizers; pharmaceuticals; resins; varnishes; lacquers; soaps and wetting agents.

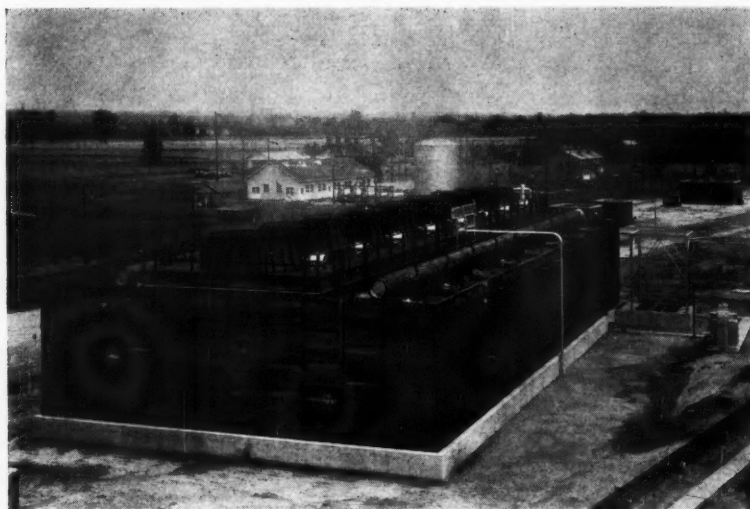
DC Antifoam A is effective in both aqueous and non-aqueous systems, and often in extremely low concentrations. For example, one part of DC Antifoam A in six million parts of asphalt results in a completely defoamed system. It has not been found that high temperatures reduce the effectiveness of DC Antifoam A; it has been used successfully in caustic evaporators where temperatures as high as 330° C. are common. The manufacturers state that there is no possibility of forming SiO_2 by decomposition of any of their silicone antifoaming agents. Pyrolysis of the compound would yield SiO_2 , but they can see no instance in application where it would take place.

To reduce foaming or frothing of lubricating oils, particularly those used in pressure pumps where air or other gases have access, to the mineral oil is added a small amount, 0.00005 to 0.01%, of an organic silicon compound, such as a di(hydrocarbon) silicate, or a di(hydrocarbon) silicone. The first substance is illustrated by a diethyl silicate, $[(\text{C}_2\text{H}_5\text{O})_2\text{SiO}]_x$ and the second by dimethyl silicone $[(\text{CH}_3)_2\text{SiO}]_x$ (U.S. 2,375,007 to Shell Development Co.). Such a silicone composition is available as DC 200 Fluid from the Dow Corning Corp. for use in oil systems.

It is a characteristic of silicone antifoaming agents that they provide a rather high interfacial tension against water (about 25 dynes/cm). While this is useful in getting a large value of S, the spreading coefficient, it unfortunately also hampers the ease of dispersion of the silicon fluid, so that the droplets of the antifoaming agent do not readily get to the films between the bubbles. Dissolving the silicone fluid in a solvent, such as 2-ethylhexanol, may therefore improve its effectiveness in aqueous systems by creating better conditions for dispersing the material.

FUTURE

This brief review has not included every type of wetting agent nor every possible type of antifoaming agent. In general, every surface-active agent is a potential antifoaming agent under the proper conditions. Many applications remain to be discovered as suppliers of these materials join with process engineers in finding new methods of combating an old manufacturing problem. The materials already available, however, constitute a great advance made chiefly within the past ten years and point the way to even better products and wider applications in the future.



The Marley Co., Inc.

Cooling towers "extend" the water supply without increasing the amount entering the plant.

Meeting Industrial Water Needs From a Limited Supply

by W. W. RODGERS,
Kuljian Corp., Philadelphia, Penna.

CAREFUL ANALYSIS OF THE THERMAL REQUIREMENTS of the water supply and employment of water conservation devices, such as cooling towers, permitted plant expansion without increasing water intake.

CONSTRUCTION of new industrial plants and expansion of existing facilities always emphasizes the need for an adequate water supply. Fuel, power, raw material and labor availability are equally important, but are usually more readily imported.

The investment in facilities to bring water from a remote source is generally so large that it is more economical to locate a project near the water source and, if necessary, bring the other elements to this location. Even when such a plan is followed, the unpredictable growth of the original plant in succeeding years together with that of other industries in the vicinity often brings about a condition where water supplies are inadequate. At this time, management must reach out for more water or adopt a policy of careful conservation and reuse. The choice is a matter of economics, usually requiring a careful engineering study. The correct solution cannot be generalized, but study of a case history will prove instructive.

MAXIMUM ECONOMY OF WATER USE

To obtain maximum economy of water use from a limited source, three phases of plant operation which involve water use must be studied:

1. Heat exchange operations, which alter only the thermal characteristics of the water.
2. Process operations, which contaminate the water.
3. Fire protection, sanitary use, wash-down, blow-down, etc., which result in complete loss of water.

The optimum redistribution of thermal values via heat exchange obviously will be different for each individual case. However, the approach to thermal distribution, cooling tower technique, and methods adopted will serve as a guide to those faced with a similar problem. No reference will be made here to detailed chemical quality requirements, only to thermal and quantitative considerations.

SPECIFIC PLANT CONDITIONS AND REQUIREMENTS

The chemical processing plant which

will provide the case history had been converted from war production to processes of an entirely different nature. In common with other neighboring plants, its supply of ground water came from a relatively close source through a jointly-owned collection and transmission system. The physical size of the pipe line was the limiting factor. Since enlarging the main was too expensive a project to be carried out by one owner, equipment for intensified reuse of the existing supply had to be installed.

Detailed study of the water needs of the new operations revealed that for general heat exchange purposes, it would suffice to aerate, coagulate and settle the supply. However, for certain heat exchange equipment, a high quality filtered water was necessary. It was equally important that water used in contact with the raw materials and products be of equal quality. Thermal qualities of both the filtered and the settled waters were established for the various processes involved, together with the quantities required for each process, totalling approximately nine thousand gallons per minute (gpm). The quantities were:

Use	Treatment	Quantity gpm
Drinking & Misc. . .	Filtered (80°F.)	75
Process	Filtered (80°F.)	1345
Heat Exchange . . .	Filtered (85°F.)	600
Fire Protection . . .	Settled	25
Heat Exchange . . .	Settled (55°F.)	1250
Heat Exchange . . .	Settled (60°F.)	1250
Heat Exchange . . .	Settled (85°F.)	4350
Total		8895

The raw water supply met the lowest temperature requirements (55°F.). The two general quality types could be obtained by settling and filtration. Theoretical waste was 1,445 gpm—the sum of contaminated process water, fire protection needs and drinking water. Other losses forced the requirements up to 1,850 gpm. With this figure as a basis, a balanced flow (accompanying diagram) was evolved.

TREATMENT FACILITIES

Only two general types of treated water, settled water and filtered water, were required. Since the plants for these had similar capacities, for economy in both construction and operation, the two plants were combined into one physical unit with provision for future expansion without disturbing plant operations. Basins were grouped about the filter building and head house to permit future additions without shut-down.

Aeration was provided with swing diffusers using carborundum tubes. Flocculators were axial-flow type. Filters had Wheeler bottoms and Palmer sweeps. Draft-tube type propeller mixers were provided for rapid mixing.

Short vertical turbine-type pumps were used whenever feasible to reduce structure costs and provide flooded suction. Spare pump capacity was needed to guar-

antee continuous service for all operations. Certain very critical thermal cycles called for two sources of power to the pumps with automatic switch-over in the event of power failure.

For continuity of service to various areas where the water was reused directly from one process to another of higher thermal range, intervening surge chambers with automatic make-up were installed. (For simplicity these are omitted from the flow diagram.)

SETTLED WATER SYSTEM

An outline of the evolution of the flow arrangement of the settled water system would be difficult. The routing of supply lines was based upon possible unbalanced requirements due to batch operation, emergency shutdowns, variations in head requirements and other considerations.

One thousand, two hundred and fifty gpm of the coldest water (55°F.) was required. This was supplied from the primary settled water systems with an elevated storage tank floating on the line. Only 50 gpm were lost, which permitted

the recovery of 1,200 gpm at about 60°F.

The requirement for 60°F. water was also 1,250 gpm and was divided into two general areas. One area used 600 gpm split off the 1,200 gpm noted above, while the other 650 gpm was supplied by a separate system. The recovered water from the systems amounted to 1,225 gpm at such a high temperature that it had to be cooled in a cooling tower before further reuse.

Thus far only 1,300 gpm had been used. The bulk of the cooling water requirements in the plant was at a satisfactorily low temperature of 85°F. The quantity needed amounted to 4,350 gpm and cooling tower capacity to supply this, 5,575 gpm. This allowed for windage, evaporation and blow-down. The losses in the settled water system averaged 275 gpm.

COOLING TOWER ARRANGEMENT

The cooling tower proper was quite conventional, being of the induced-draft type with aeroplane propellers. The basin arrangement was a feature that permitted the selection of thermal quality for

various purposes. As previously stated, the various processes required only 1,500 gpm, including normal losses. Of this quantity, 1,225 gpm could be withdrawn without disturbing the thermal and quantitative balance. The expected temperature of the cooling tower basin (under normal summer conditions) was 85°F. Therefore, 1,225 gpm @ 85°F. were available for withdrawal for further treatment in the filter plant. But 1,525 gpm were required for this use. Consequently, 300 gpm additional capacity was needed from the settled water treatment plant, bringing the total output to 1,800 gpm.

To be sure that the most favorable thermal qualities were maintained in certain processes, the total make-up of 550 gpm @ 55°F. was brought into a pump suction chamber integral with the cooling tower structure. From this chamber 650 gpm were pumped as shown on the flow diagram. An opening between this chamber and an adjoining one permitted the excess to flow through and mix with the 1,225 gpm available from the cooling tower basin. Under balanced normal conditions, the average temperature in the second chamber would be 77°F., a suitable supply for the filtered water plant.

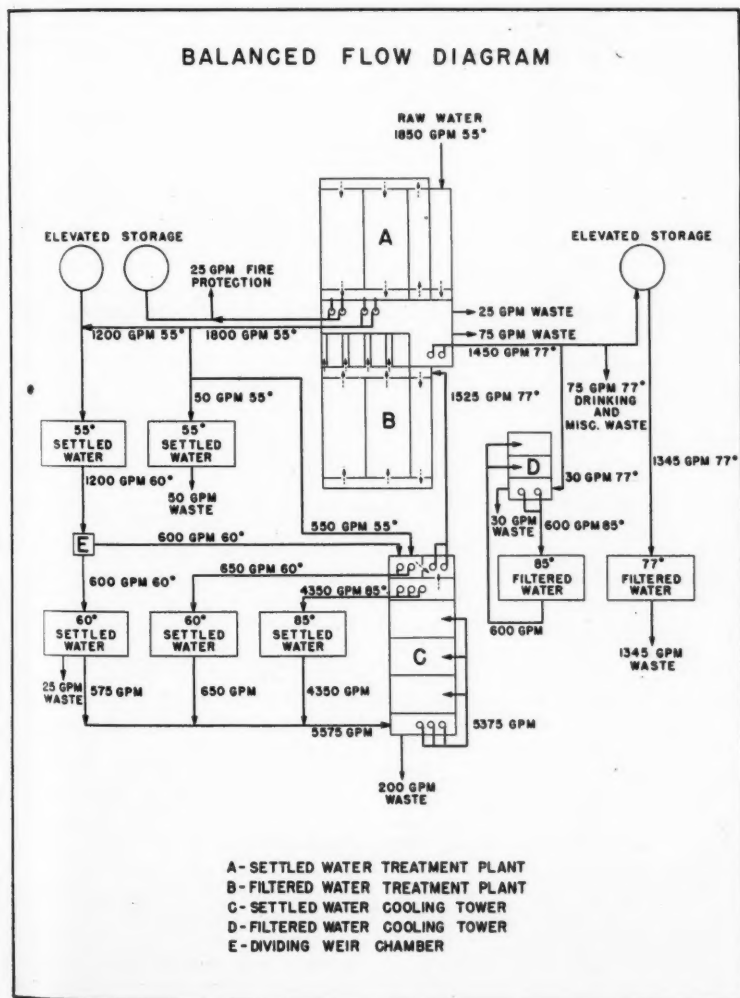
FILTERED WATER SYSTEM

The total filtered water requirements was 2,050 gpm. Of this, 600 gpm were uncontaminated and had to be at 85°F. Thus, 600 gpm could be recirculated over an induced draft cooling tower which required a normal make-up of 30 gpm. The filtered water output was, therefore, 1,450 gpm at about 77°F.

The filtered water used in contact with the product had to meet unusually high standards of quality and every effort was made to provide uniformity and eliminate any possible contamination from pipe lines or other parts of the system. To prevent pipe line deposits (which inevitably occur) from being disturbed, the same direction of flow had to be maintained in the lines feeding filtered water to those processes where water and product came into contact. To accomplish this, these areas were supplied directly from a storage tank which, in turn, was separately supplied from the filter plant. In this way, the flow direction could not change and the contents of the tank were constantly replaced with fresh water.

SUMMARY

In certain localities, water is a costly and not too plentiful commodity. It may have chemical characteristics which make treatment expensive and call for conservation. This is not merely a matter of waste prevention; it is an integration of quantitative, qualitative and thermal requirements to permit a *minimum* supply to maintain a *maximum* of cooling and process load.



FINISHED PACKAGE PLANNING RECORD																								
Sales		Production		Ordered						Stock Bal. 1st of Month			Fore- cast Bulk	Actual Sales Bulk	Sched- uled Bulk	Actual Bulk	Remarks							
Forecast	Actual	Sched'd	Actual	Date Due	Amount	Batch No.	Label No.	Date Fin.	Amount	Planned	Minimum	Actual												
JAN																								
FEB																								
MAY																								
JUNE																								
Total																								
12 mo.																								
Ave.																								
Month																								
Package Supplies Needed										Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Minimum Stock:		
Bottle:																						Package Size:		
Cap:																							Product: No.	
Gel Band:																								
Packer:																								

Scheduling Production and Controlling Inventory

In a Small Volume, High Unit Value Industry

by FRANK J. MESSMANN, Director of Production and Purchasing
The Wm. S. Merrell Company, Cincinnati, Ohio

2,000 RAW MATERIALS, 350 PRODUCTS in fluctuating demand. That's enough to confound any production manager, but here is how a pharmaceutical plant handles the situation to keep inventories low, equipment in maximum use.

DURING and following the war, the first concern of most managements was production, more production, and more production. Potential sales exceeded production capacity, and prices could go nowhere but up. Recently many industries have caught up with sales, and emphasis has now shifted to the proper methods of controlling the flow of production to assure an uninterrupted supply to sales with the lowest possible investment in inventory.

The pharmaceutical industry, in most cases, has been faced with this problem

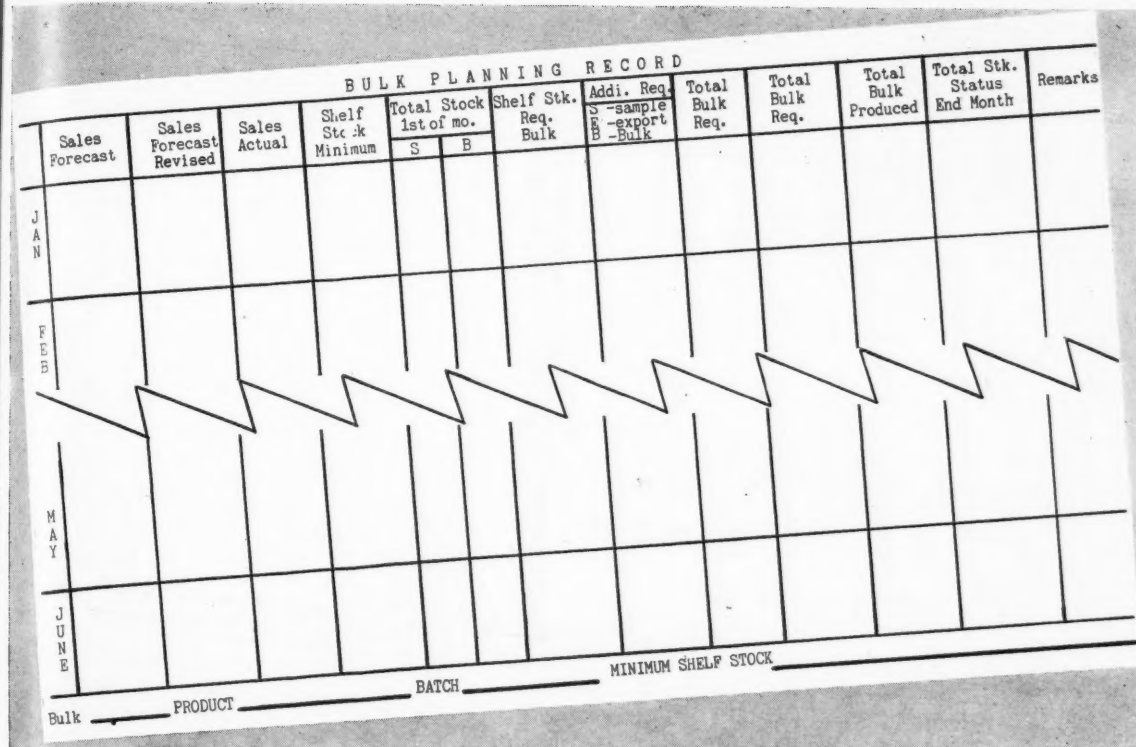
for many months because productive capacity and raw material supplies have been more than adequate to meet sales requirements. With but few exceptions, production in the pharmaceutical industry is on a batch basis. Usually a wide variety of products are made in quantities that to the chemical industry would vary from small-scale laboratory batches to chemical pilot plant batch sizes. The problem of controlling inventories is complicated by the tremendous variation in value of products as well as by the large variation in rate of sale. For in-

stance, some tablets may cost 10 cents per thousand while others cost 10 cents apiece. Some are sold in units of 20 tablets while others are sold in units of 10, 20, and even 50,000. Production batches range in size from extremely small batches which may be made in a one or two gallon mixer to other production requiring the purchase of raw materials in carload and tank car quantities.

The Merrell Company, of medium size, produces about 350 different products requiring about 2,000 raw materials and package supplies.

INVENTORY POLICY

Control of inventory is obtained by operating under a clearly defined inventory policy. In the pharmaceutical industry in-



ventories are frequently higher than in many other industries. Total inventory of raw material, material in process, and finished stock may be from six to nine months. There are several reasons for this in the drug industry.

1. Many of the products are lifesaving drugs for which the doctor cannot wait for delivery until next week or next month.
2. Demand is apt to fluctuate tremendously as a result of epidemics or catastrophes. Reserve stocks must be adequate to meet these unusual demands.
3. Some of the basic raw materials are naturally occurring and a whole year's supply must be purchased during marketing season.

The usual procedure is for top management to determine over-all inventory policy as it relates to sales position, capital available, and so forth. Then the production-control department is instructed to maintain inventories within certain limits expressed in either dollars or months' supply.

In order to simplify the control of inventory, products are often considered by classes:

1. Slow-moving products of low unit value will usually be prepared in standard batch sizes with only minor regard for the number of months inventory that one standard size batch will provide. For this type of product, labor, manufacturing, and assaying costs on a number of small batches

are balanced against the cost of additional investment in inventory. In the pharmaceutical industry, each lot of every raw material is tested, weighed separately and double checked, and every batch of manufactured product is subject to extensive analytical tests. It is thus frequently more economical to produce one batch which yields from six to nine months' stock than it is to produce several smaller batches to yield a lesser total stock.

2. Slow-moving products of high unit value are ordinarily made in batches which furnish only the quantity needed to meet minimum inventory needs. This is particularly important if the raw materials are subject to considerable price fluctuations.
3. The most important class of products is those which are made frequently in fairly large batches. Sales requirements are more easily determined on these products, and production can be scheduled readily and varied to meet current changes in requirements.
4. Continuous processing is relatively infrequent but presents a number of problems. Usually inventories can be kept quite low on these items because raw materials are purchased in large quantities and deliveries can be scheduled so that extremely small stocks are kept on hand. Problems of inventory and scheduling of such products will not be discussed be-

cause this is the general problem of the chemical manufacturing industry.

SALES FORECAST

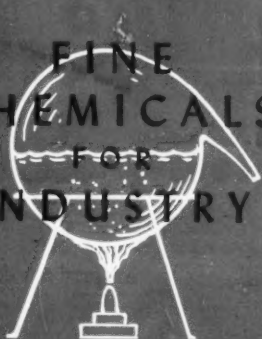
When inventory policies have been set, the basis for control is the forecast of sales. Sales forecasts are ordinarily prepared by either the sales department or the production-control department. At the Merrell Company, the production-control department prepares estimates of future sales of each package for approximately a year in advance. These estimates are then submitted to the sales department for their consideration and approval. Estimates are based on past sales, current sales trends, and expected future conditions. From the point of view of production, this procedure is more satisfactory than having the sales department prepare the original estimates. Traditionally, sales departments are optimistic and usually estimates are prepared in terms of dollars and not units. It is extremely important, however, to have the sales department check all estimates because they are better able to determine the probable impact on sales of advertising campaigns, sales drives, and competition from other products.

The job of forecasting sales for 350 products is quite formidable. To save time and reduce the cost and still secure adequate control, the products are classified into two principal groups:

Class 1—fast moving items, representing a relatively few items but a large proportion of sales, are reviewed monthly

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CHEMICALS
FOR
INDUSTRY



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AT LAST!



A valve bag with a positive locking device

Field tests all over the country are daily proving two marked improvements in the new, exclusive SHUR-CLOSE Valve Bag!

1. Less dusting when packing.
2. Less sifting when packed.

The SHUR-CLOSE valve has a two-way action with the two bottom sections of the valve crossing over to give quick, complete seal after bag is filled. Besides, the overlapping action at top of valve channels material and open slit at bottom allows faster flow... as much as one bag more per minute per tube.

Write today for samples of the STA-STAK multi-wall bag with SHUR-CLOSE valve. This A & S combination of a specially designed outer creped sheet and the revolutionary SHUR-CLOSE valve is a natural for packing flour, fertilizer, food products and chemicals.



SHUR-CLOSE Valve Bags on hand truck. Note that bags are clean and free from dusting and sifting.



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THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES



W. E. Hanford, elected a vice-president of The M. W. Kellogg Co. He was the company's director of petroleum and chemical research.

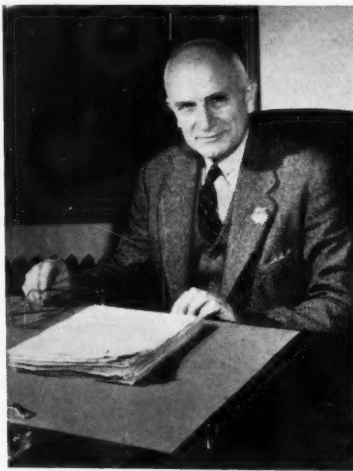


Warren L. McCabe, named vice-president in charge of research, The Flintkote Co. He joined company in 1947 as research director.

PEOPLE



T. S. Carswell, appointed vice-president in charge of research, Commercial Solvents Corp.



George B. Beitzel, recently-elected president of the Pennsylvania Salt Manufacturing Co.



Life photo (Copyright Time, Inc.)

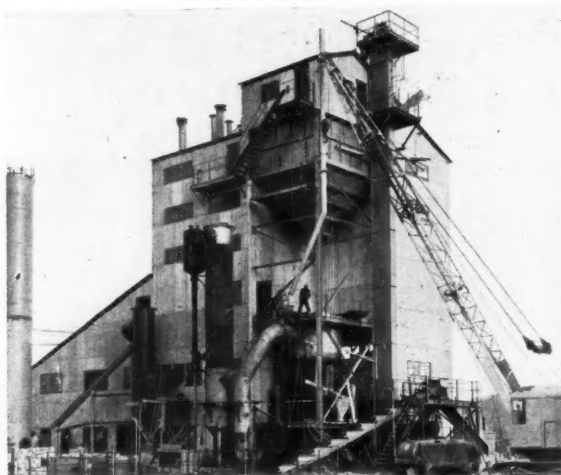
Arthur B. Lamb of Harvard University, awarded the Priestly Medal of the ACS. He was cited for his outstanding services to chemistry.



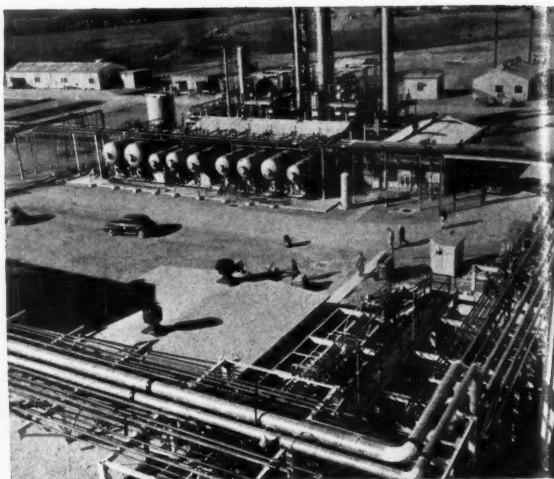
William H. Lycan, new director of research, Johnson and Johnson. For the past 11 years he has been with Pittsburgh Plate Glass Co.



Leland I. Doan, elected president of the Dow Chemical Co. He was formerly vice-president and director of sales for the company.



The coal gasification unit under construction. It is estimated that it will produce about two million cubic feet of synthesis gas daily.

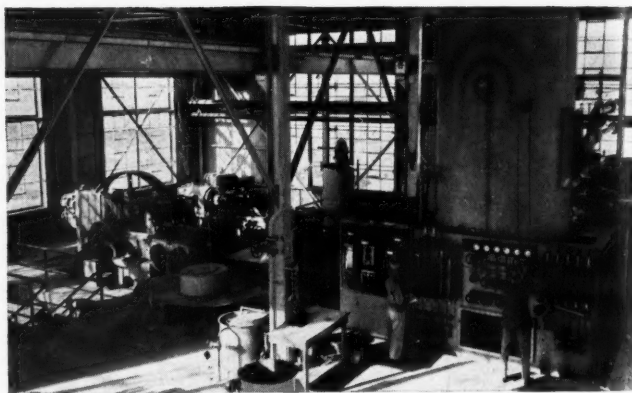


Distillation area (upper center) of the unit. The maze of tubing in the foreground links other parts of the plant with the converters.

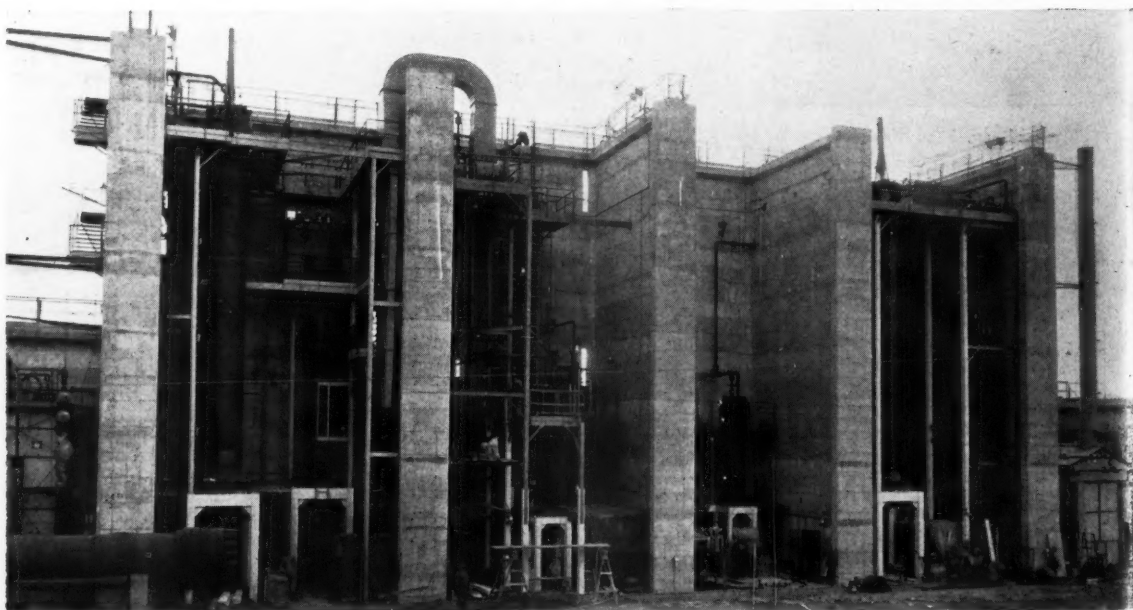
Oxygen Plant for Coal Gasification

The Bureau of Mines is opening the first tonnage oxygen plant to be used for coal gasification purposes in this country at its Coal-to-Oil Demonstration Plants, Louisiana, Mo. To extract oxygen from air, it has had a modern Linde-Frankl unit shipped from Höchst, Germany, where it was originally used by I. G. Farben in making acetic acid. The unit has a capacity of 23,000 cubic feet or 1 ton per hour of 98% oxygen.

The feasibility of using oxygen in the production of synthetic oil and gasoline from coal depends entirely upon the cost of the oxygen. As a source of tonnage oxygen, the Linde-Frankl unit will help the Bureau evaluate these costs.



Oxygen is extracted from air at temperatures more than 300° below zero in this equipment. Operators are at the controls of the oxygen rectification column.

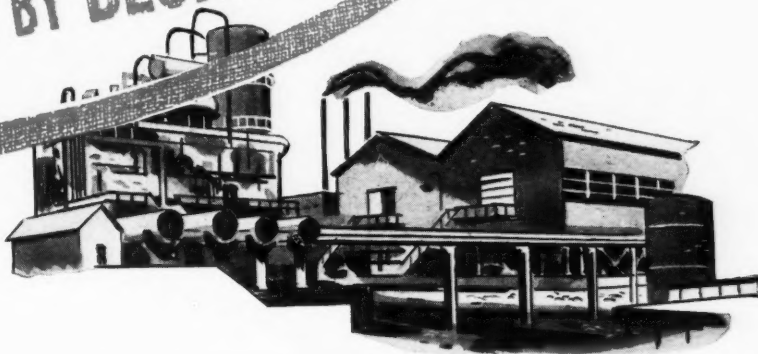


Stalls of heavy, reinforced concrete enclose on three sides the giant chrome steel converter vessels in which coal is transformed to oil.

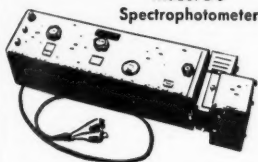
The Mark of a Modern Chemical Processing Plant...

INSTRUMENTATION BY BECKMAN!

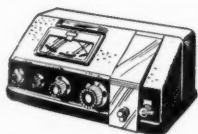
In both industry and science the name "Beckman" has become synonymous with leadership in a vital field of instrumentation—that of adapting complex scientific instruments to the quick and accurate solution of modern analytical and control problems. If you are not using these Beckman Instruments in *your* operations, you should investigate today the important savings they can make for you...



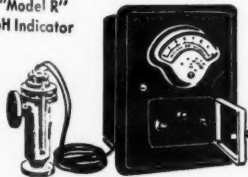
"Model DU"
Spectrophotometer



"Model B"
Spectrophotometer



"Model R"
pH Indicator



OTHER BECKMAN INSTRUMENTS include IR-2, IR-3 and Flame Spectrophotometers, Radioactivity Meter, Photopen Recorders, Flow Colorimeters, Ultrameters and other advanced instruments. For the most modern in instrumentation, consult Beckman!

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is ideal for industrial and research laboratories to facilitate the speed and accuracy of chemical analyses... of color-matching paints, textiles dyes, paper, etc... of controlling quality and uniformity in the production of drugs and pharmaceuticals... of simplifying metallurgical analyses, hydrocarbon determinations and many other diversified applications. This versatile instru-

ment covers the ultraviolet, visible and near-infrared spectral regions, and gives both % Transmission and Density readings on solid, liquid and gaseous samples. It is unusually simple to operate, incorporates many unique design features that insure sustained accuracy and dependability, and it can be used with a wide range of accessories to further increase its all-around utility.

THE BECKMAN "MODEL B" SPECTROPHOTOMETER

combines many unique spectrophotometric advancements in a low priced instrument that is particularly suited for routine analytical operations. This instrument has better ultraviolet performance, better resolution, better wavelength and photometric accuracy, and more freedom from stray light than any other instrument in its price field. It has many uses in industrial laboratories for simplifying analytical operations in chemical, metallurgical, pharmaceutical and hydrocarbon processes—as well as for quick, ac-

curate color-matching applications in textiles, paints, paper and other similar fields where close color control is essential. It covers the visible region as well as portions of the ultraviolet and infrared spectrums and can be used on liquid, solid or gaseous samples. The "Model B" brings the speed, accuracy and versatility of modern spectrophotometric analytical methods into the price range of even the most modest laboratory—yet it incorporates vital features found in no other instrument in its field.

BECKMAN GLASS ELECTRODE pH INSTRUMENTS

are universally recognized as leaders in the industry. Not only does Beckman provide the widest variety of pH meters—portable, research, AC-operated and battery-operated, as well as completely automatic equipment for large-scale process control—but Beckman also provides the industry's greatest variety of glass electrodes for use with its instruments. Since the accuracy and utility of pH equipment is limited by the electrode systems available for use with it, Beckman's

unequaled range of glass electrodes is of utmost importance.

Wherever there is water or water solutions—slurries, moist pastes or moisture-containing semi-solids such as cheeses, doughs, jellies, etc.—there is pH. If you have fluid processes or products *anywhere* in your operations, chances are you can save time, minimize waste, by Beckman-controlling the pH of your operations. *Write outlining your problems and our experienced engineers will be glad to assist you without obligation.*

Our trained research staff will outline the important savings you can make by installing Beckman instruments on *your particular operations*. Write, wire or phone for further details. Beckman Instruments, National Technical Laboratories, South Pasadena 17, California.

BECKMAN

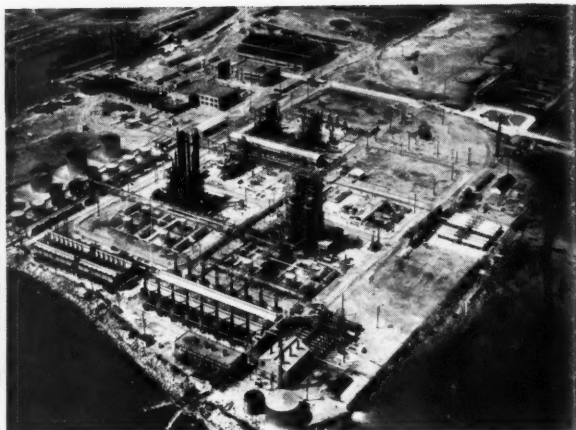
INSTRUMENTS CONTROL MODERN INDUSTRIES

pH Meters and Electrodes—Spectrophotometers—Radioactivity Meters—Special Analytical Instruments

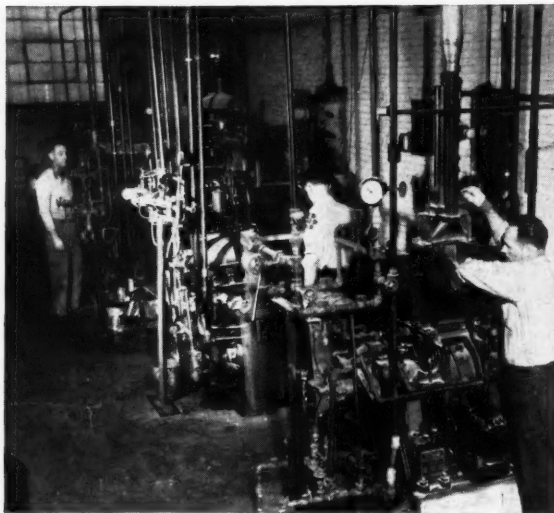
Monsanto Reopens Styrene Plant



At the reopening of its Texas City styrene plant, Monsanto Chemical Co. dedicated a memorial inscribed with the names of those lost in the disaster of April, 1947. After the dedication, a tour of the rebuilt plant was made.



Its capacity is about 60,000 tons of styrene a year, as compared with 72,000 for the original plant. The ceremonies were followed by a symposium on "Gulf Coast Hydrocarbon Resources" at the Shamrock Hotel in Houston.



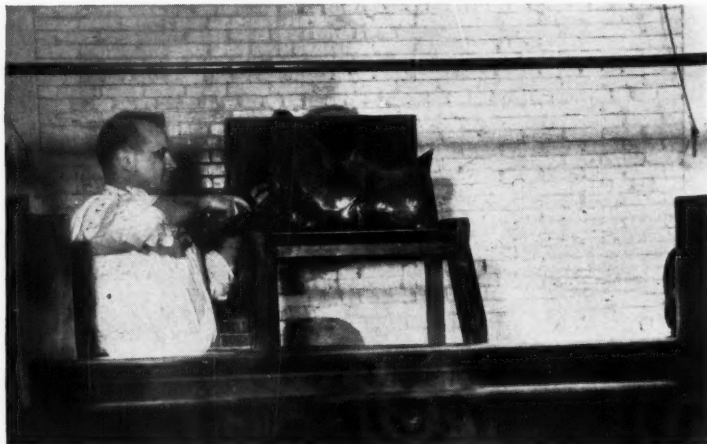
Pilot plant, where all formulations are tried out before production. Foreground, Banbury Mixer; center, warming mill; rear, calender.



Marvinal VR-10 is poured into the top of the blending machine, where it will be mixed with pigment and other ingredients of formulation.

PVC For Upholstery

Columbus Coated Fabrics Corp. uses polyvinyl chloride-base upholstery stock extensively. This plastic sheeting has gained wide acceptance for upholsteries because of its washability, pliability, and uniformity of texture. It also has high tear strength. The sheets are formed by the calender method since vinyl resins become plastic at elevated temperatures. The raw materials consist primarily of the resin, or film former, a plasticizer or softening material to create flexibility, pigment, and fillers or loading materials to give body to the stock.



After it leaves the mixer, the plastic mass is checked for temperature by a special thermometer, and then rolled into continuous sheets of carefully controlled thickness.

Even Evaporation

Better Solvent Strength

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HI-FLASH
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CMRA Scroll

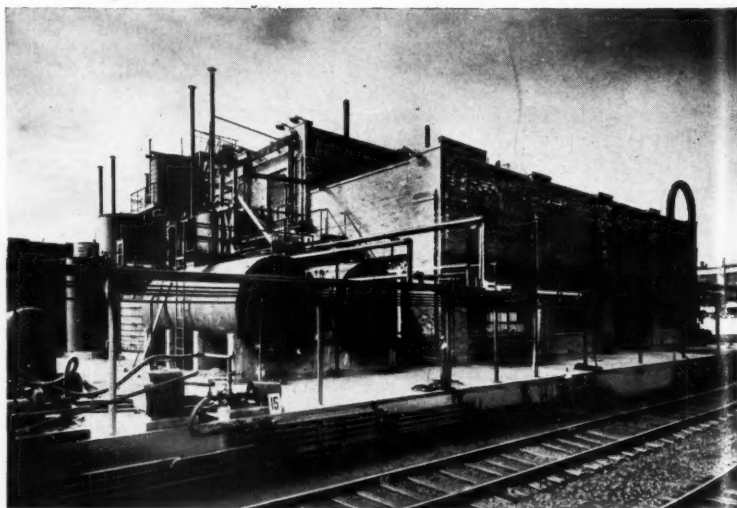


At the recent Chemical Market Research Association meeting in St. Louis, the speakers were presented with an unusual scroll, a memento of their participation in the program. Each scroll has a photograph of the speaker and is adorned with stamps depicting Pasteur, the Curies, Berthelot and other greats of chemistry.

Above, A. H. Winheim, Planetary Chemical Co., receiving his scroll. At left is S. P. Gibson, president, CMRA, and at right R. M. Lawrence, chairman of the St. Louis meeting.



Beta-Naphthol Plant



The Hilton-Davis Chemical Co. Division of Sterling Drug, Inc. has recently opened a new plant for the production of beta-naphthol, important intermediate for

organic colors and dyes. With this added capacity, it is expected that Hilton-Davis will become one of the three major manufacturers of beta-naphthol.

How many of these Industrial Chemicals do you use?

Acid Molybdic, Purified 85% Powder
 Acid Nitric, Technical, 36° to 42°
 Acid Silicic, Fluorescent Grade
 Acid Silicic, Amorphous Fluorescent Grade
 Acid Tungstic, Purified Powder
 Ammonium Molybdate, Fine Crystal, 81-81½%
 Ammonium Perchlorate, C. P. Crystal
 Ammonium Sulfate, Purified White Granular
 Ammonium Sulfide, 40% Solution
 Ammonium Thiocyanate, Technical Crystal
 Barium Carbonate (Radio Grade)
 Barium Hydroxide, C. P.
 Barium Thiocyanate, Technical
 Bismuth Nitrate, Purified
 Calcium Nitrate, Technical Crystal
 Calcium Thiocyanate, Technical
 Carbon Bisulfide, Technical
 Carbonates—Triple
 (Barium, Strontium, and Calcium)
 Cobaltous Oxide, C. P.
 Copper Thiocyanate, Technical
 Cupric Chloride, Purified
 Cupric Nitrate, Purified
 Ferric Chloride, C. P.
 Lead Acetate, Technical
 Granular, Crystal, Lump and Powder
 Lead Nitrate, Technical Crystal
 Magnesium Carbonate, Technical Light Powder
 Magnesium Nitrate, Recrystallized
 Magnesium Oxide (Neoprene Grade)
 Mercuric Oxide, Technical Red and Yellow
 Potassium Sulfate, Double Refined Powder
 Potassium Thiocyanate, Technical Crystal
 Sodium Bisulfate, C. P.
 Sodium Molybdate Technical Anhydrous
 Sodium Sulfate, C. P. Anhydrous
 Stannous Chloride (Tin Crystals)
 Strontium Carbonate (Radio Grade)
 Zinc Acetate, Technical Crystal
 Zinc Oxide, C. P.

The demand for dependable industrial chemicals for processing has caused Baker continually to widen its line of Industrial Chemicals.

Above you will find listed 38 of these Industrial Chemicals—each a sales leader. If one or more of these chemicals interests you, please write. We will be glad to quote prices and send you further data. Address: J. T. Baker Chemical Co., Executive Offices, Phillipsburg, New Jersey.



Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

VINYLATION and ETHYNYLATION: New Unit Processes

EDITORIAL STAFF REPORT

APPLICATION OF HIGH PRESSURE acetylene techniques brings forth two new unit processes, vinylation and ethynylation, and a series of unique primary and secondary products.

TWO NEW unit processes, vinylation and ethynylation, are emerging from the pilot plant of the General Aniline and Film Corp. at Grasselli, N. J. (*CI, April, 1949, p. 596*). Both use acetylene at pressures and temperatures considered unsafe prior to the German work (Reppchemie) in the late 'thirties.

VINYLATION

Vinylation is the introduction of a vinyl group ($\text{CH}=\text{CH}-$) into a molecule by reaction with acetylene.

At present two primary derivatives are being prepared by vinylation at General Aniline's new pilot unit, vinyl methyl ether and Koresin. However, the vinyl methyl ether unit can be used to produce other vinyl alkyl ethers by substituting the appropriate alcohol for methanol.

Vinyl methyl ether is being utilized as the intermediate for three other materials: polyvinyl methyl ether, dimethyl

chloroacetal, and a copolymer of vinyl methyl ether and maleic anhydride.

VINYL METHYL ETHER

Vinyl methyl ether is formed continuously under a pressure of sixty psi by passing acetylene through methanol containing a small percentage of potassium hydroxide. The reactor is an un baffled vertical cylindrical tower. (Because an un baffled reactor is used, acetylene must be diluted with an inert gas such as methane or nitrogen.)

Heat of reaction vaporizes the product and some methanol which passes off with the excess acetylene through a dephlegmator. The dephlegmator returns a portion of the methanol which comes off with the ether to the reactor. Crude vinyl ether from the dephlegmator, still containing some methanol, passes to a thirty-five plate distillation column in which the crude ether is degassed. The acetylene here separated is returned to

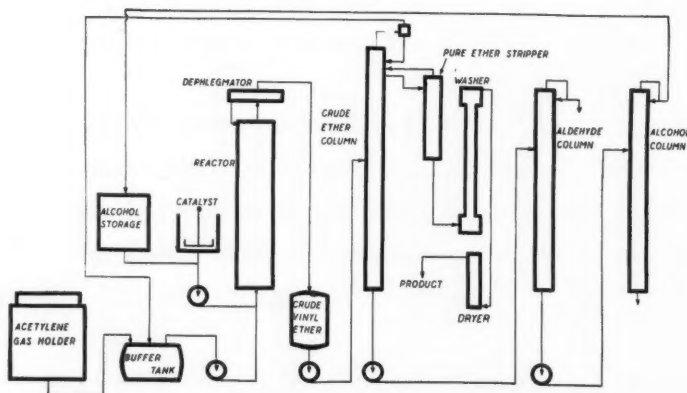
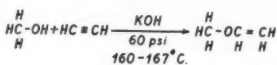
the buffer or surge tank. Ether condensate passes to the pure ether stripper, from which pure ether in the vapor state passes through a wash column where it is contacted with water containing a small percentage of alkali. After washing, the ether is dried prior to storage by passing over a solid desiccant. A small quantity of alkali, usually triethanolamine, is added to stored ether to prevent hydrolysis or polymerization.

Methanol from the bottom of the crude ether column passes to the thirty-plate aldehyde column where one to two per cent acetaldehyde is recovered overhead. From the bottom of this column impure methanol passes to the so-called alcohol column from which the methanol is removed overhead for recycling, a small percentage of high boiling liquid (mainly acetals) being drained from the bottom of the column.

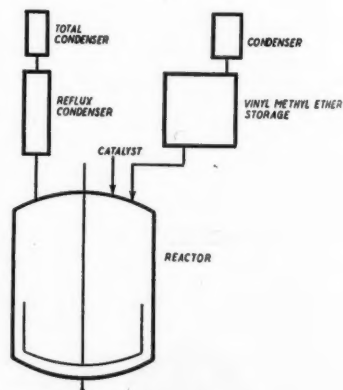
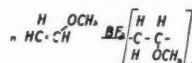
POLYVINYL METHYL ETHER

Polyvinyl methyl ether is formed by a batchwise boron trifluoride catalyzed polymerization. The stainless steel polymerization vessel, which is internally cooled, has a special anchor-type agitator that scrapes polymer from the walls of

METHYL VINYL ETHER



POLYVINYL METHYL ETHER



Backed by the Nation's Largest
Petroleum Research Laboratories

ENJAY OXYGENATED SOLVENTS AND HYDROCARBONS

The famous labs of our affiliate, Standard Oil Development Company, are dedicated to developing more and better chemicals from petroleum to meet your growing needs. Many of the new products that have come from this vast research organization are marketed by ENJAY* COMPANY. Constant checking and testing is carried on here to insure the high quality and stability of all chemicals sold by ENJAY.

This constant research means that the ENJAY oval trade mark always assures top quality and uniformity to our customers.

For complete information on uses and properties of the ENJAY products listed below, write us today. You'll find our technical staff always ready to supply any data and guidance you may need.

ENJAY SOLVENTS

PETROHOL* Isopropyl Alcohol (91%, 99%)—
 $\text{CH}_3\text{CHOHCH}_3$
Secondary Butyl Alcohol— $\text{CH}_3\text{CHOHCH}_2\text{CH}_3$
Isopropyl Acetate— $\text{CH}_3\text{COOCH}(\text{CH}_3)_2$
Secondary Butyl Acetate— $\text{CH}_3\text{COOCH}_2\text{CH}_2(\text{C}_2\text{H}_5)$
Isopropyl Ether— $\text{C}_3\text{H}_7\text{OC}_3\text{H}_7$
Methyl Ethyl Ketone— $\text{CH}_3\text{COC}_2\text{H}_5$

ENJAY HYDROCARBONS

Butadiene— $\text{CH}_2=\text{CHCH}=\text{CH}_2$
Isobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)_2$
Diisobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{C}(\text{CH}_3)_2$ †
Triisobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{C}(\text{CH}_3)_2$ †

† Other isomers also present.

CTLA POLYMER

An economical heat-reactive, aromatic-type olefinic hydrocarbon. Highly unsaturated. Dries by polymerization and oxidation. Miscible in all proportions with drying oils. Compatible with most resins.



ENJAY COMPANY, INC.
15 West 51st Street, New York 19, N.Y.

* Trade Marks



VINYLATION and ETHYNYLATION (Continued)

the vessel and the cooling cylinder. Refluxing vinyl methyl ether monomer controls the reaction temperature. Molten polymer is tapped from the bottom of the reactor.

All high polymers of vinyl alkyl ethers require special treatment to render them stable not only to heat and light exposure but to aging at room temperature. If such stabilizers as 4-t-butyl-m-cresol or 4-t-butylphenol are not added, the polymers in a relatively short period of time are transformed into balsam-like or liquid products. This is accelerated by heat, light, or acidic materials.

DIMETHYL CHLOROACETAL

Tank car quantities of dimethyl chloroacetal have been shipped for use in the synthesis of sulfathiazole. This compound acts as if it were chloroacetaldehyde, forming 2-amino-thiazole by condensation with thiourea.

Dimethyl chloroacetal is produced by batchwise chlorination and methylation of vinyl methyl ether in the presence of sodium hydroxide which enters the reactor as a methanol solution. Crude product from the reactor passes to a batch still from which dimethyl chloroacetal is recovered overhead in a mixture with water and chloroform. This condensate passes to a gravity separator, water being removed from the top and the chloro derivatives from the bottom. The latter pass to a second still which first removes the chloroform overhead, and then dimethyl chloroacetal.

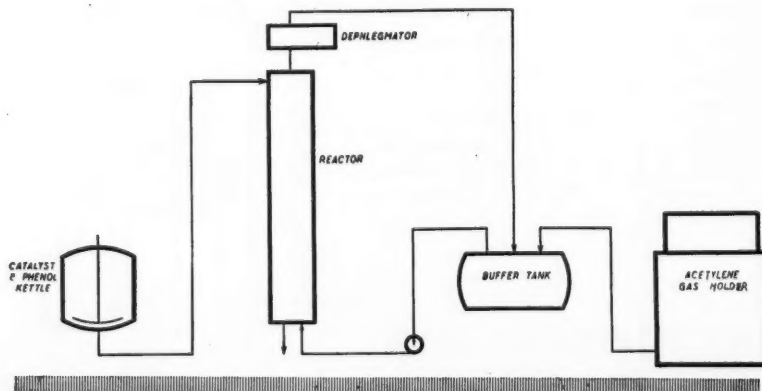
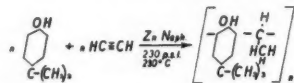
KORESIN

Koresin, which is formed by vinylating an alkyl phenol, is believed to be a polymer of a vinyl alkyl phenol. It was first

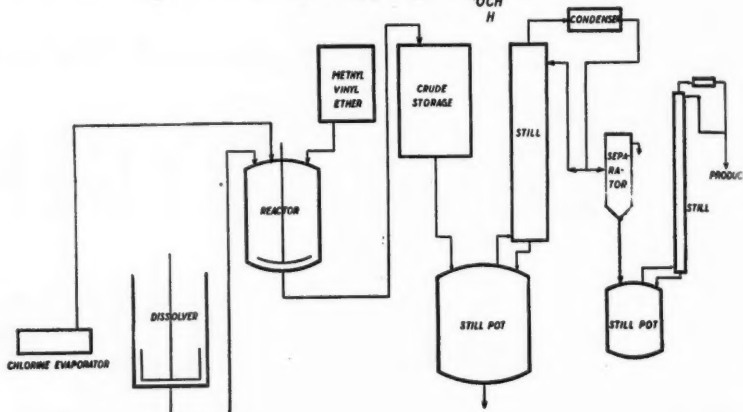
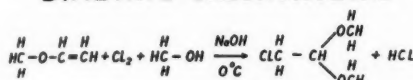
discovered in Germany and used there as a tackifier for the German synthetic rubber. However, it has made little headway in this country for this purpose.

Koresin is made in a batch reactor into which the catalyst, zinc naphthenate, and p-t-butyl phenol are added at the top. Acetylene at a temperature of 230° C. and a pressure of 230 psi bubbles through the mixture, passing to a dephlegmator which returns unreacted alkyl phenol to the reactor. Acetylene from the dephlegmator passes to a buffer tank for recycling. No purification of product is required, the major control being the amount of acetylene added to the alkyl phenol, usually para-tertiary butyl phenol.

KORESIN



DIMETHYL CHLOROACETAL



ETHYNYLATION

Ethynylation is the condensation of acetylene with aldehyde to preserve the triple bond. When formaldehyde is used such alcohols as propargyl alcohol and butynediol-1,4 are formed. During the war this reaction provided the Germans with twenty per cent of their butadiene requirements: Butynediol-1,4 was hydrogenated to butanediol-1,4, which was dehydrated to form tetrahydrofuran. Dehydration of tetrahydrofuran yielded butadiene (*CI, May, 1947, p. 766*).

BUTYNYEDIOL-1,4

Butynediol-1,4 is the product of ethynylation of formaldehyde with acetylene in the presence of a copper acetylide catalyst. In General Aniline's pilot plant this is carried out in a continuous reactor. By keeping cross-sectional diameter of all open sections in the reactor to less than one-half inch, it is not necessary to dilute the acetylene with an inert gas. Both formaldehyde and acetylene enter at the top of the reactor. The product is degassed to remove excess acetylene. In the pilot plant this is vented to the atmosphere, although in any final plant it would be recycled. After cooling, the liquid product passes through filters for removal of the solid copper acetylide catalyst, then through a cold degasser for further removal of acetylene. This cold product is next passed to a batch still where excess formaldehyde is recovered overhead. Still bottoms pass to a mixing tank where sodium hydroxide is added to remove silica from the butynediol. (The Germans utilized magnesium hydroxide for this purpose.)



THE NAME TO WATCH IN CHEMICALS

D-40 DETERGENT HELPS DO A BETTER WASH FASTER, MORE ECONOMICALLY

The super wetting action, fast penetration and high surface activity of D-40 Detergent makes many tough wash jobs easier. Quick solubility in hard or soft water, exceptional stability in acid or alkaline solutions, greater foam heights and easier rinsing are a few additional advantages of this outstanding detergent. Cleaning compounds can be greatly improved by the addition of D-40. It is easily and economically blended with many other materials and is unsurpassed as a cleaner by itself.

Whether you wash walnuts or windows, bottles or buildings, D-40 helps do the wash faster, at lower cost. Investigate this important product today. Call the Oronite office nearest you for more detailed information.



A typical example of the versatility and usefulness of D-40 Detergent is in solutions of sodium hypochlorite for washing and bleaching walnuts and deciduous fruit. Here, the high surface activity, quick solubility, fast penetration and stability of this outstanding product help solve an important washing problem. So, if you want to speed up the wash and spruce up the product, choose D-40 Detergent.

ORONITE CHEMICAL COMPANY

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STANDARD OIL BLDG., LOS ANGELES 15, CALIFORNIA

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If yours happens to be flameproofing... Investigate VICTOR DIAMMONIUM PHOSPHATE

Today, phosphate of ammonia is generally recognized as the most effective flameproofing agent. Victor diammonium phosphate is used extensively and with great success in the flameproofing of textiles, paper, and wood. Such properties as effectiveness in preventing after-glow, and versatility of application are responsible for its increasing popularity. For complete information, write today or fill in and return the coupon.

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MAIL THIS COUPON TODAY!

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Gentlemen:

Send additional information on Victor diammonium phosphate for flameproofing to:

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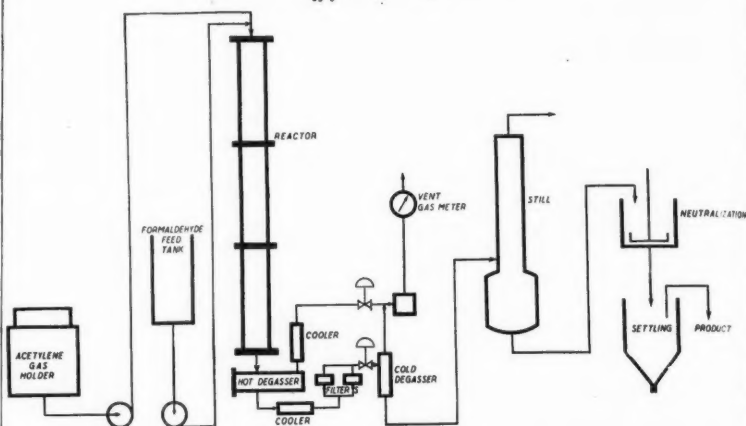
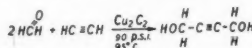
Street

City Zone State

V2

VINYLATION and ETHYNYLATION (Continued)

BUTYNYEDIOL



Controlling the amount of formaldehyde that adds to the acetylene will permit the production of the triple-bonded C₃ alcohol, propargyl alcohol. Other aldehydes produce the corresponding diol derivatives. The combination of a triple bond and oxygen substituents gives a most versatile intermediate.

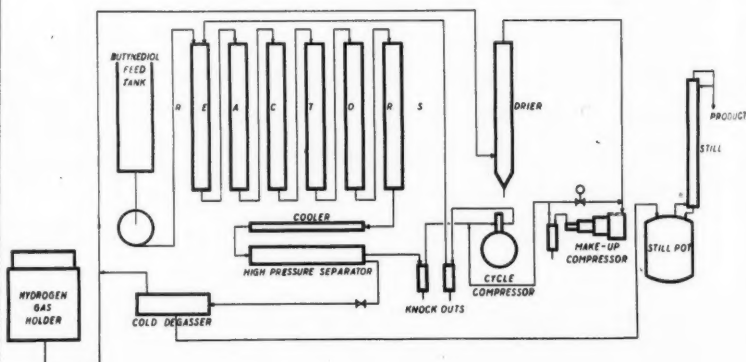
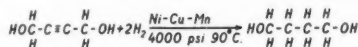
BUTANEDIOL-1,4

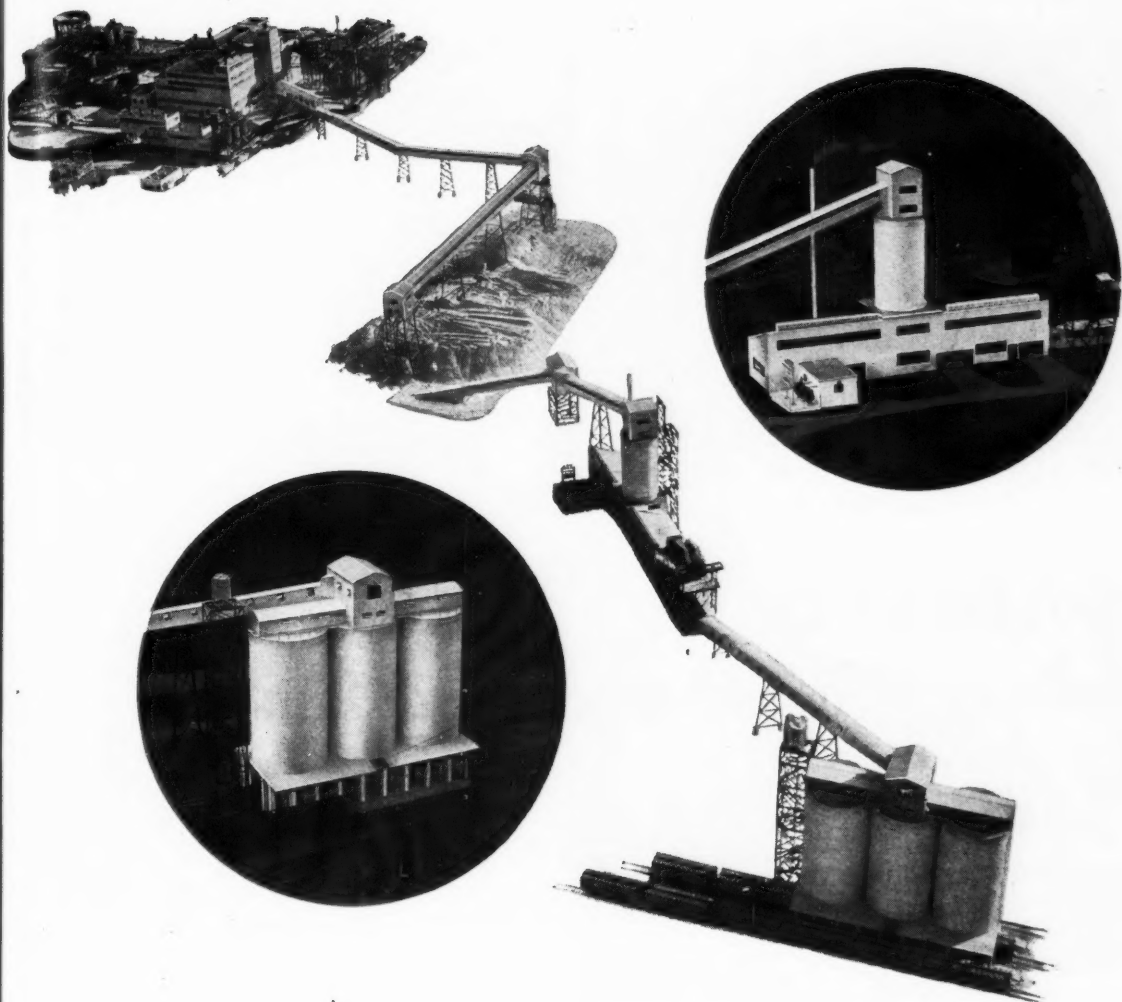
At present butanediol-1,4 is the only secondary product which General Aniline is preparing from the primary butynediol-1,4. This is formed by treating butynediol with hydrogen in the presence of a nickel-copper-manganese catalyst at

a pressure of 4,000 psi and a temperature of 90° C. The hydrogenation is carried out by passing the butynediol feed in parallel flow with hydrogen through a series of six reactors. The liquid leaving the reactor is cooled and excess hydrogen separated before it is passed to a still for purification. Incoming hydrogen is dried before entering the four-stage compressor, which it leaves at 6,000 psi.

The nickel in the catalyst promotes addition of hydrogen to the triple bond while the copper effects reduction of any hydroxybutyraldehyde formed by rearrangement of the intermediate butynediol.

BUTANEDIOL





New Drying and Storage Plant at Noralyn Phosphate Mine

Larger tonnages of high grade phosphate than ever before are now available from International's Florida mines as a result of the completion of new drying and storage facilities at the new Noralyn Mine.

Phosphate from the Noralyn Washer and Flotation Plant is carried by overhead belt conveyors and distributed by grades on wet storage. From an underground tunnel, selected material is conveyed to the drying plant shown in the photo at upper right where it is dried to standard specifications. It is then conveyed to the storage silos shown in the lower left photo where it is loaded automatically into rail cars.

The modern new drying and storage plant at Noralyn Mine will increase production capacity, speed deliveries, and improve service to buyers of International's Florida Phosphate for agricultural and industrial markets, domestic and foreign.



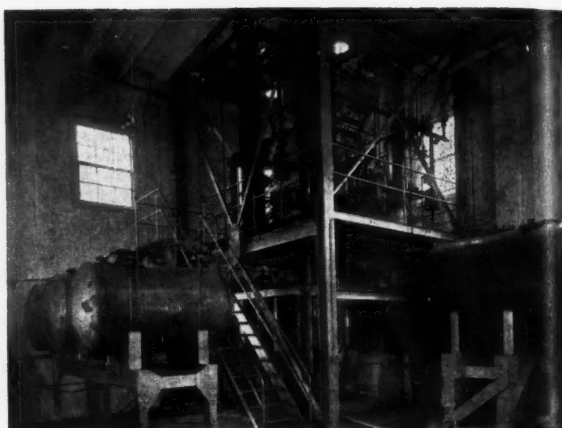
Tennessee Phosphate ALL COMMERCIAL GRADES Florida Pebble Phosphate

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

GENERAL OFFICES: 20 NORTH WACKER DRIVE, CHICAGO 6



Pot still that Callison used for six years before new installation.



New continuous still standing 50 ft. high with 2400-lb. daily output.

PEPPERMINT OIL

Continuous Process Replaces Batch Distillation

by W. J. GRANBERG, Seattle, Wash.

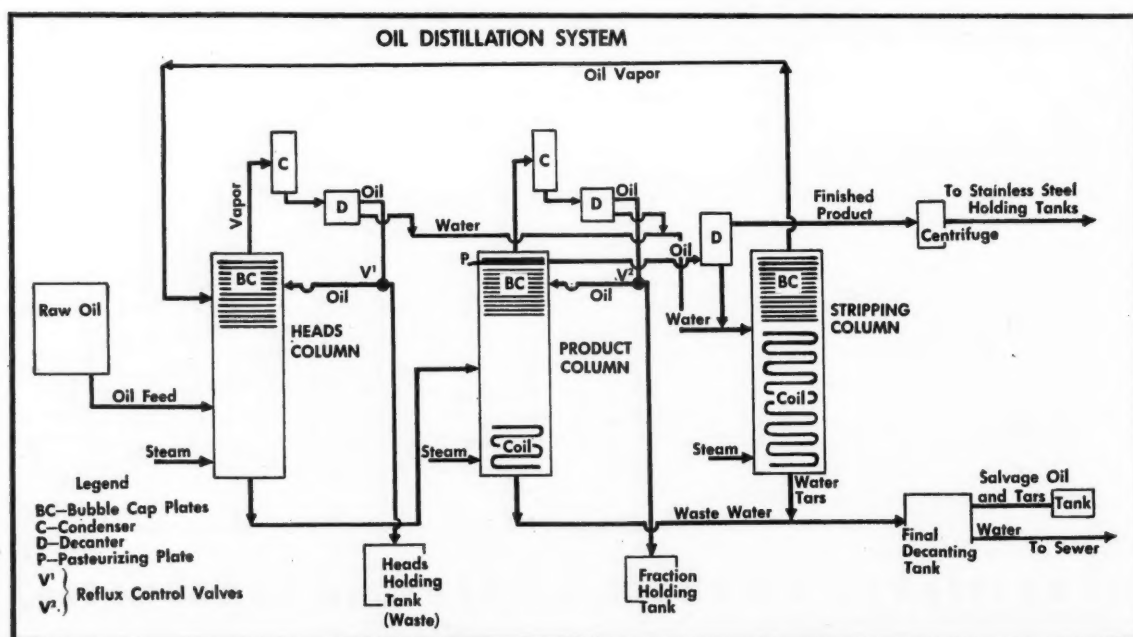
CONTINUOUS FRACTIONATION OF PEPPERMINT OIL by I. P. Callison & Sons represents a departure in the essential oils industry.

INSSTALLATION of a \$100,000 continuous-process fractionating still for the production of peppermint oil has just

been completed by I. P. Callison & Sons, Chehalis, Wash. The new still, designed and built by E. B. Badger & Sons Co.,

Boston, marks a forward step in the essential oils industry.

With the Pacific Northwest taking the lead last year in the growing of mint, producing 800,000 pounds of oil with a value of \$5,350,000, the Callison company became the nation's second largest



Zinc Chloride

FOR USE IN—Preserving wood; Finishing paper and textiles; Flameproofing and dyeing textiles; Galvanizing; Manufacturing vulcanized fibre, batteries and glue.

Zinc Sulphate

FOR USE IN—Fertilizers and orchard sprays; dyeing and printing textiles; Electro plating; Electro galvanizing; making rayon, paint, varnish, glue.

At Wheatland, Pa., Maneely Chemical Company has one of the most efficient, modernly equipped chemical plants in the country.

Glass lined vats and equipment and a new process combine to give a new high in uniformity, purity and quality.



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Basic Chemicals for Agriculture

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44% Isopropyl Ester Sol.

40% Triethanolamine
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DDT

100% technical grade
wetttable dust
emulsifiable solutions

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Chemical Works, Inc.

Manufacturers of
Organic Chemicals

80 LISTER AVE., NEWARK 5, N. J.

PEPPERMINT OIL (Continued)

producer of peppermint oil for the gum, toothpaste, candy and food products industries. The company entered this field in 1943 with a plain pot still having a capacity of 100 pounds, with a fractionating column of six theoretical plates.

After data had been obtained and verified, the company called upon the Badger company to design and build the continuous-process fractionating still to its requirements for rectifying the natural peppermint (*mentha peperita*) oil. The still stands 50 feet high and has a capacity of more than 2,400 pounds of oil daily. Relatively low temperatures are employed in the steam distillation process, thereby reducing thermal decomposition and making possible the retention of the oil's original flavor and odor. The still also permits the separation of intermediate fractions.

GRADES ARE BLENDED

The oil is received by Callison in 50-gallon galvanized metal drums from the mint growers, who steam-distill the oil from the leaves in a simple condenser and decanter process. Since the oils from the mint-growing areas vary, they are classified as to region and then graded: (1) Good and bland; (2) Good and sharp; (3) Medium; (4) Poor, according to taste and odor. The oils are analyzed in the laboratory for esters, menthoids, and dimethyl sulphide; optical rotation and specific gravity are determined.

Labeled as to classification, the drums of oil are stored at 45° F. until needed. The varied grades are then blended to meet the customer's specifications. The broad cross-blends permit duplication of a customer's formula. Odor and flavor are determined by a panel of employees; the latter property is tested by adding oil to candy fondant.

From the blending tanks the oil goes to a 1,000-gallon, tin-lined copper holding tank at the foot of the still from which it is pumped into the No. 1, or "heads" column. The flow is registered and con-

trolled through Flo-rators on the central panel at the base of the columns.

DISTILLATION PROCEDURE

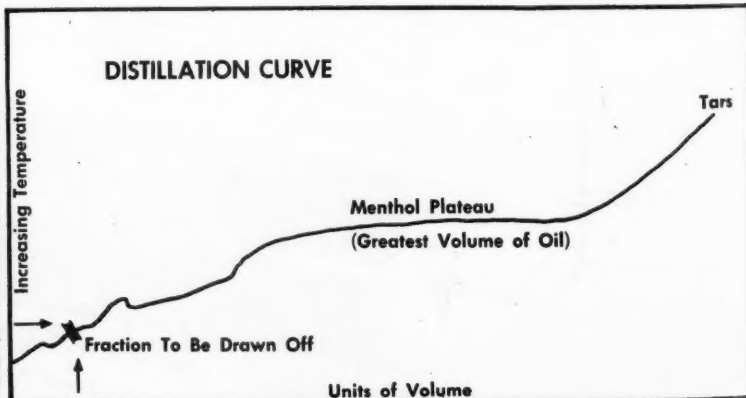
The heads column and the adjoining product column are of tin-lined copper and use bubble-cap plates with a twelve inch spacing. Low-pressure steam enters the heads column near the bottom, carrying the lower-boiling, lighter fractions in the oil to the top of the column where they are condensed, the condensate running into a reflux decanter. Here the oil rises to the top and drains back into the column through a weir, while the water is split off under a baffle plate near the bottom and piped to a stripper where any residue of oil is boiled off, condensed and piped to the heads column.

Steam temperature in the product column is slightly higher than that in the heads column. The product column vaporizes the foots from the heads column. Here again the oil vapor moves into the condenser and to the decanter, while the water goes to the stripper with the recovered oil returning to the heads column.

The finished oil is drawn off at one of the upper plates, decanted to separate it from the water, and piped to stainless steel storage tanks. Waste in the process amounts to two to four per cent and is in the form of tarry bottom oils in the product column.

A high reflux ratio permits certain minute fractions of the oil to be concentrated and isolated. These are run off into small holding tanks. Some are objectionable and valueless, while others are used in compounds. It is this facility for removing fractions which constitutes the greatest single advantage of the huge still.

When the finished product is to be shipped it is pumped from the (storage) tank to blending tanks and then to a Sharples centrifuge, operating at 16,000 r.p.m., which removes excess moisture and solids. It is drained into drums for shipping.



Acetamide

(Ethanamide: Acetic Acid Amine)

99% TECHNICAL — 99.5% REAGENT

Another **ORGANIC**
for Industry
by



REMARKABLE SOLVENT PROPERTIES for a wide variety of organic compounds. Acetamide can be readily linked to hydrocarbons through its methyl group; to ketones, esters and acids through its carbonyl group; to alcohols and water through its tautoric hydroxyl group, and to ammonia and ammonia derivatives through its amino group.



INGREDIENT IN SOLDERING FLUXES for tin or tinned metals, particularly in high speed lines . . . Acetamide helps promote an even flow and distribution of flux.



IN TEXTILE DYEING: Acetamide may be used as a solvent for dyestuffs whose utility is limited by poor solubility. In such applications, Acetamide also acts as a wetting agent and a penetration accelerator for the dye.



AS A PLASTICIZER: Is a useful plasticizer for glue, gelatin, leather and various films and coatings.

PROPERTIES:

Formula	$\text{CH}_3\text{CO}\cdot\text{NH}_2$
Mol. Wt.	59.07
Boiling Point	222°C.
Melting Point	81°C.
Specific Gravity	1.159 (gms/ml) at 20°C.

Soluble in water and alcohol;
very slightly soluble in ether.



FOR THERMOPLASTIC ADHESIVES: Acetamide is also used for the preparation of anhydrous thermoplastic adhesives which are particularly valuable for sealing cardboard food containers, since they are non-toxic, odorless and chemically neutral.

* **ACETAMIDE** is available in PBL* fibre drums—100 and 225 pounds net.

✓ **SAMPLES ON REQUEST**—write on your business letterhead to nearest Baker & Adamson office listed below.

* polythene bag liner



BAKER & ADAMSON *Reagents*

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SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks are carried here.

NEW PRODUCTS & PROCESSES

Cotton Insecticide NP 894

Permits spraying cotton by low-gallonage method for first time.

A powerful new all-purpose cotton insecticide combined with a newly-developed sprayer for the first time permits low-gallonage treatment of cotton for insect control.

Sherwin-Williams Co.'s Agricultural Chemicals Division has introduced the new product, "Kiltone." A specially formulated liquid water-mixable concentrate that combines toxaphene (chlorinated camphene) and DDT, the chemical works with maximum effectiveness against all

major cotton pests—bollweevil, bollworm, fleahopper, leafworm, thrips, grasshoppers, stink bug, army worm, lygus and other plant bugs.

Besides its use on cotton, "Kiltone" also is highly effective for insect control on tobacco, cabbage, onions, beans, potatoes and peanuts, the manufacturer reports.

A specially-designed sprayer for use on tractors makes it possible to treat an entire acre using a pint to a quart of the chemical in two to five gallons of water. At present "Kiltone" can be applied only with this type sprayer for ground work.

The development of the "Kiltone"

method of spraying is an outgrowth of the use of wettable powders by a number of California cotton growers last year. The cost of using "Kiltone" has been found to average about \$1.50 per acre for the material alone. It comes in one gallon, five gallon and 53 gallon containers. The chemical and sprayer are sold exclusively through Sherwin-Williams branches and dealers.

Nonyl Alcohol NP 895

High-pressure synthesis yields trimethylhexanol at Du Pont Co.

Trimethylhexanol, technically known as 3,5,5-trimethylhexan-1-ol, is now available for commercial purposes for the first time from the Du Pont Co.

Trimethylhexanol, a colorless, mobile liquid of mild odor, is made by high-pressure synthesis and as manufactured, is a single substance of high purity and not a mixture of isomers. It has a boiling point of 374° F., and is not soluble in water.

Trimethylhexanol undergoes many chemical reactions, yielding compounds which are expected to find numerous important commercial uses. It reacts with other compounds to give products which appear promising as synthetic lubricants, as additives to lubricating oils to prevent undue thickening at low temperatures, as wetting agents, and as softeners in the manufacture of various plastics.

Potassium Cyanate NP 896

American Cyanamid introduces chemical reagent in semi-commercial quantities.

Now available in semi-commercial quantities from the American Cyanamid Co., potassium cyanide offers broad possibilities in chemical syntheses.

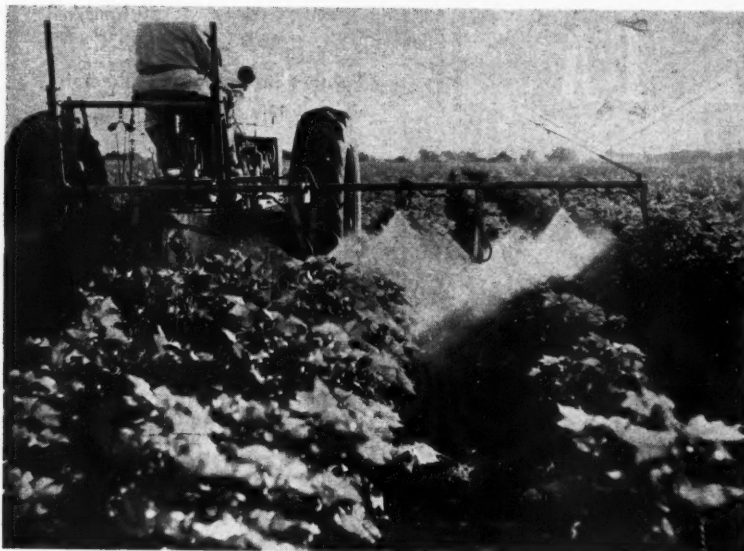
Reactions readily occur with such compounds as amines, alcohols, sulfonamides, acids, dialkyl sulfates, alkylene oxides and silicon tetrachloride. Products which may be prepared will find potential application in pharmaceuticals, surface-active agents and agricultural chemicals.

Potassium cyanate is a crystalline solid of m.p. 310°C., very soluble in water, giving a solution with a pH of about 9.2.

Polyvinyl Formal NP 897

An extrusion grade of polyvinyl formal is now made by Shawinigan Products Corp.

Formvar, polyvinyl formal, the toughest of the thermoplastic resins, is now available in extrusion grade from its manufacturer, Shawinigan Products Corp., New York. Its tensile strength is 12,000 p.s.i. at 20° C., which is higher than that of some of the newer plastics many times its cost. Because of this inherent toughness, it has heretofore been applied



CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (5-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 894	NP 898	NP 902	NP 906
NP 895	NP 899	NP 903	NP 907
NP 896	NP 900	NP 904	NP 908
NP 897	NP 901	NP 905	NP 909

Name (Position)
(Please print)

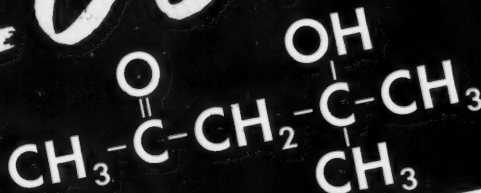
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Street

City (Zone) State

From SHELL CHEMICAL...

DIACETONE ALCOHOL



high-boiling solvent for cellulose ester lacquers

Diacetone Alcohol gives exceptional performance as a high-boiling solvent for cellulose acetate and cellulose acetate butyrate... is excellent for nitrocellulose. The presence of Diacetone Alcohol in *your* lacquer formulations will result in an improved product with these advantages:

Better film flow. Diacetone Alcohol is widely employed to control the evaporation rate of lacquers. A small quantity, in combination with active lacquer solvents, imparts improved flow properties to the final product.

Greater blush resistance. Diacetone Alcohol not only improves film flow, but it also eliminates blushing during the application and drying of the lacquer film. A superior film appearance is thus obtained.

Mild Odor. Diacetone Alcohol is particularly suitable for use in interior brushing lacquers, because of its faint but pleasant odor. This property, together with its slow evaporation rate, makes Diacetone Alcohol excellent for dipping and roller-coating applications.

Properties

Molecular Weight	116.16
Specific Gravity 20/4°C	0.9382
Boiling Point (760 mm)	166°C (approx.)
Freezing Point	-44°C
Refractive Index	1.4232
Vapor Pressure 20°C	0.84 mm Hg

Lacquer Solvent Properties

Dilution Ratio	
Toluene	3.0
Aromatic Naphtha	1.0
Aliphatic Naphtha	0.5
Viscosity 25°C (8% soln. ½ sec. nitrocellulose)	153 cps.
Blush Resistance (% relative humidity at 80°F)	87
Rate of Evaporation (n-butyl acetate = 1.0)	0.2

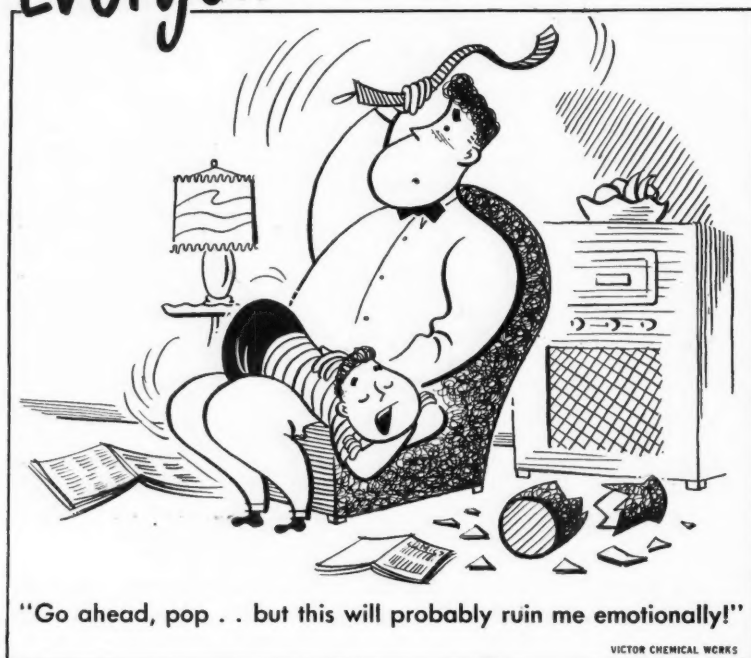
Other Applications. An effective solvent for penta-chlorophenol, the widely used wood fungicide... excellent in hydraulic fluids... an important ingredient of industrial dyes and stains.

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Everyone has problems



If yours happens to be chrome tanning... Investigate VICTOR PROTAN® SODIUM FORMATE

Leather tanners all over the U. S. and Canada are effectively employing Victor Protan sodium formate as a masking agent in chrome tanning. Careful laboratory work and regular plant use have proved that Protan sodium formate provides a more rapid tannage, greater exhaustion of chrome and increased yield of footage. It also makes possible more uniform tannage and a smooth grain with a full, round feel. Additional information and experimental samples are available. Write or fill in and return the handy coupon.

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Gentlemen:

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- ☐ Send additional information on Victor Protan sodium formate for chrome tanning.
☐ Sample of Protan sodium formate.

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Company _____

Street _____

V2 City _____ Zone _____ State _____

only from solution, but new extrusion equipment and techniques now make possible the production of tubes, rods, sheets, etc.

Formvar has excellent warp resistance, abrasion resistance, and a high heat distortion point. It is completely resistant to oils, gasoline, aliphatic hydrocarbons, fats, waxes, and it is also resistant to alkalis. These characteristics make it attractive for automotive parts, machine parts, gasoline and oil lines, and many other industrial uses.

Solvent

NP 898

High flash-point wax and oil solvent safer to use than naphtha.

Visco VS, a new high-flash-point solvent for wax, grease, lube oils, paint, and fusible or soft resins has been announced by Visco Products Co., Inc.

Visco VS is non-injurious to skin, non-corrosive, and will not injure surfaces of metal or wood. Having a relatively high flash point, it is much safer to use than naphtha or other low-flash-point petroleum solvents.

As a cleaner, Visco VS may be safely used to remove oil-treating chemicals, wax, grease, lube oils, extreme pressure lubricants, and paint from skin, wood or metal surfaces. It may also be used as a general solvent where a slight blue discoloration would not be objectionable.

Visco VS is available immediately in 55-gallon drums and 5-gallon cans.

Colors

NP 899

A new line of coating colors uses a universal vehicle rather than various ones.

Hilton-Davis Chemical Co. has started production of what it calls its "U-Line" of flushed colors for the protective coating industry. It is a group of pigments with a special universal vehicle used in the composition of paint, drying oil enamels, alkyd enamels or lacquers. Previously various different vehicles were required.

First five colors in the line are chrome yellow, iron blue, lithol red, toluidine toner and chrome yellow. New colors are being added each month, and when it is complete the "U-Line" will include all colors commonly used by the protective coating manufacturers. The colors are available in 5 gallon kits and 55 gallon drums.

Cyclohexadiene

NP 900

Farchan Research Laboratories makes cyclic intermediate in research quantities.

Farchan Research Laboratories has announced the availability of 1,3-cyclohexadiene in research quantities. This cyclic, conjugated diolefin is a very versatile compound and lends itself readily to its use as the diene in the Diels-

How to make "Karbate" pipe connections.



1. A "Karbate" flexible coupling ready for assembly. Note rubber gasket covering serrations on right hand pipe, $\frac{1}{4}$ " from end. Gasket lying on table will be similarly applied over serrations on left hand pipe.



2. Flexible coupling being tightened in place.

KEEP "KARBATE" PIPE ALWAYS IN STOCK!

- Resists the action of acids, alkalis and other chemicals
- Light weight with adequate strength
- Resistant to mechanical shock
- Immune to thermal shock
- Easy to machine and install
- Full range of sizes and fittings

For more details, write to National Carbon Company, Inc., Dept. CI

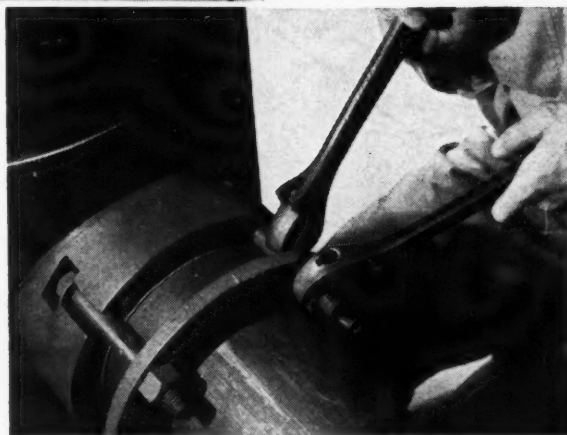
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Unit of Union Carbide and Carbon Corporation



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Division Sales Offices: Atlanta, Chicago, Dallas,
Kansas City, New York, Pittsburgh, San Francisco

Foreign Department: New York, U. S. A.



3. "Karbate" pipe being joined to gas inlet of a "Karbate" absorption tower by means of strong "Type V" flanged connection. Note flat place on bolt in foreground. This provides purchase for the second wrench to assure tightness in joint.

THESE PRODUCTS SOLD IN CANADA BY CANADIAN NATIONAL CARBON CO., LTD., TORONTO 4, CANADA

AMMONIA

is many things to many chemists

AMMONIA is a well known and widely used industrial chemical. It is the leading refrigerant and the main source of nitrogen for fertilizers. Petroleum refiners use Ammonia to neutralize acid in oil.

Ammonia is oxidized to make nitric acid or to furnish nitrogen oxides for producing sulphuric acid by the chamber process. Ammonia extracts certain metals from ores. It is a solvent and reaction medium in organic synthesis.

Ammonia is a nutrient for yeast and a nitriding agent for alloy steels. Cracked into its gases, Ammonia is a protective atmosphere for bright annealing, powder metallurgy and brazing. Dissociated Ammonia also supplies hydrogen for welding and for producing metal powders.

Ammonia is a processing agent in the manufacture of alkalis, rayon, dyes, pharmaceuticals, butadiene, and catalysts for cracking petroleum. Ammonia is used with chlorine to purify water.

Ammonia has literally hundreds of industrial uses. For information, contact Barrett, America's leading distributor of Ammonia.

Barrett Standard Anhydrous Ammonia is available in 50, 100 and 150-pound cylinders from stock points conveniently located from coast to coast.

Is
**YOUR Industry listed
among these users
of Ammonia**

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City Gas • Copper • Cyanides
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Explosive • Fertilizer • Fireproofing •
Household Cleaners • Industrial Alcohol
• Inorganic Chemicals • Insecticides •
Magnesium • Medical Gas • Metallurgical
• Mildew Proofing •
Molybdenum • Nickel
• Nitric Acid • Organic
Chemicals • Paper •
Petroleum • Pharma-
ceutical • Pigments •
Plastics • Radio Parts
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• Rubber •
• Sugar Refining
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• Textile • Yeast

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America's Leading
Distributor of
AMMONIA

Alder reaction, as well as in reactions involving the 1,2- and 1,4-addition. This unique system of double bonds presents opportunities for investigation of such typical reactions as polymerization, dimerization and copolymerization yielding products of interest to the plastics and allied industries.

This compound is a colorless liquid of characteristic odor. It has a molecular weight of 80.1, a boiling point of 80.4°C. at 760 mm., a freezing point of -104.9°C. a density of 0.8405 at 20/4, and an index of refraction at 20° of 1.4741.

Gentisic Acid

NP 901

Monsanto makes available for research an anti-rheumatic pharmaceutical.

Chemicals which show promise in the treatment of rheumatic disorders are now available to the pharmaceutical industry in limited quantities from Monsanto Chemical Company's Organic Chemical Division.

The products, commonly known as gentisic acid and sodium gentisate, are chemically related to aspirin. Gentisic acid, it is believed, may be the chemical produced by the body from sodium salicylate, which has long been used in the treatment of rheumatic diseases.

Extensive work must still be done by the pharmacologists and clinicians before the utility of the products is fully established. Gentisic acid and related products are being made available to the pharmaceutical industry for research on the broad scale necessary for such development.

Propiolactone Derivatives

NP 902

B. F. Goodrich Chemical introduces three intermediates derived from propiolactone.

B. F. Goodrich Chemical Company is now making available, in experimental quantities, three new Good-rite chemicals not previously disclosed in the literature.

(Benzothiazyl-2)-carboxyethyl Sulfide.—This product has a low water solubility, molecular weight 239, melting point 139-141° C.; can be recrystallized from alcohol. It is light buff-colored and dissolves readily in NaOH solutions. It is reprecipitated by the addition of acid.

β-Isothioureido. Propionic Acid.—This product can be recrystallized from water and is obtained as a hydrate or in anhydrous form, depending on the drying conditions used. It has a molecular weight of 148, melting point 178-180° C and is supplied as a white, crystalline anhydrous substance.

β-Dithiocarbamylpropionic Acid.—This product has a low water solubility and can be recrystallized from an ether-petroleum ether solution. It is white, crystalline, has a molecular weight of 165 and melting point of 124-126° C. It dis-

A page from the Stauffer Catalog

NUMBER SIX IN A SERIES

SILICON TETRACHLORIDE

Other Names None.

Formula SiCl_4 .

Properties Clear, colorless to pale yellow, heavy liquid. It fumes in moist air and the fumes are sharp and choking. Silicon Tetrachloride decomposes in water to form gelatinous silicic acid and hydrochloric acid. It is miscible in all proportions with carbon tetrachloride, tin tetrachloride, titanium tetrachloride and the sulphur chlorides. When not in contact with moisture, Silicon Tetrachloride is not corrosive to iron or steel, and steel tanks and drums may be used in storing and handling it.

Specific Gravity 1.48 @ 68°/60° F.
Weight per gallon 12.4 lbs. approx.
Boiling Point 57.6° C. (135.8° F.)
Melting Point -70° C. (-94° F.)
Refractive Index $n_D = 1.412$

Grades Technical and C.P.

	Technical Grade	C.P. Grade
Analysis	Silicon Tetrachloride . not less than 99.5%	not less than 99.8%
Free Chlorine	not more than 30 ppm	not more than 2 ppm
Titanium Chlorides, as Ti	not more than 50 ppm	not more than 10 ppm
Iron, as Fe	not more than 10 ppm	not more than 1 ppm
Distillation Range	2°C. from first drop to dryness	1.0°C. from first drop to dryness
Color	colorless, free from sediment	

Principal Uses Silicon Tetrachloride reacts with alcohols to form organic orthosilicates or esters. Tetraethyl Silicate is an example found useful as a hydrolyzable material which deposits silica when applied in cements and paints for weatherproofing, and as a bonding agent in molding sands. Silicon Tetrachloride is a useful starting material for the synthesis of many compounds. Notable examples are the silicones, including new organo-silicon polymers of widely useful application as stable insulating resins, lubricants and heat transfer liquids. The methyl-chlorosilanes, intermediates for the methyl silicones, are interesting water-repellent materials, as are also the amino silanes. Very pure silicon and silicon dioxide for special purposes, may be prepared from Silicon Tetrachloride. It is also a convenient source of hydrogen chloride when it is decomposed with water or steam; about 84% of its weight is available as HCl.

	Net Weight Lbs.	Approx. Gross Weight
Packing		
Bottles—1 gal. (boxed)	12	30
Drums—55 gal.	625	752
10 gal.	120	145
Tank Cars		

Shipping Regulations Corrosive Liquid—White Label.
(Express shipment limited to 1 quart in one pkg.)

Stocks Niagara Falls, New York.

STAUFFER PRODUCTS

BHC (Benzene Hexachloride)
Borax
Boric Acid

Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chlordane

Chlorine
Citric Acid
DDT (Dichloro Diphenyl Trichloroethane)
Silicon Tetrachloride
Sodium Hydrosulphide

Sulphur (Specially processed for all industrial uses)
Sulphur Chloride
Sulphuric Acid
Tartaric Acid

Textile Stripper
Titanium Trichloride
Toxaphene (Chlorinated Camphene)
2, 4-D (Acid, Isopropyl Ester, Amine Salts)



STAUFFER CHEMICAL CO.

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phia 44, Pa. Plant: Exton, Pennsylvania.

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MINERAL COMPANY

*A Step Ahead
in Industrial Ores
and Chemicals*

solves readily in NaOH solutions and is reprecipitated by the addition of acid. A zinc salt can be formed by adding a water solution of a soluble zinc salt, as zinc chloride, to a water solution of the ammonium or an alkali metal salt of β -dithiocarbamylpropionic acid. The zinc salt is a white solid melting at 145° C. (decomp.). The zinc salt will react with amines, such as cyclohexylamine, to form addition complexes. If β -dithiocarbamylpropionic acid is dissolved in alcohol and ammonia passed in, the insoluble ammonium salt precipitates. This is a white solid melting at 123-125° C.

These compounds may be expected to undergo the usual reactions of fatty acids such as esterification, salt formation, amide formation, etc.

A data sheet and samples are available on letterhead requests to Chemical Sales Department, B. F. Goodrich Chemical Company, 324 Rose Building, Cleveland 15, Ohio.

Tetrahydrophthalic Anhydride

NP 903

Versatile unsaturated dibasic acid now in pilot-plant production.

Farchan Research Laboratories is now in pilot-plant scale production of tetrahydrophthalic anhydride (4-cyclohexene-1,2-dicarboxylic anhydride). This active olefinic dicarboxylic anhydride is a very versatile compound and lends itself readily to the formation of esters, adducts to the double bond and as intermediates in the manufacture of pharmaceuticals, dyestuffs, essential oils, alkyd resins, varnishes, polynuclear compounds and general organic synthesis. The esters of tetrahydrophthalic anhydride are potentially valuable plasticizing agents and stabilizers for rubber and plastics, as copolymerization agents with styrene, as detergents on sulfonation and as insecticides.

The product is a white crystalline solid having a molecular weight of 152.1 and a melting point of 103-4° C. (cis).

Isopropyl Phenols

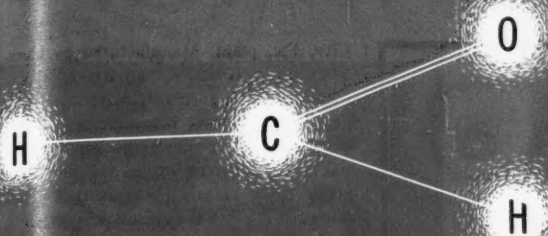
NP 904

New alkylated phenols, of interest in organic synthesis are now commercially available.

The Chemical Division of Koppers Co. Inc., is now offering commercial quantities of the isopropyl phenols. These materials, although new as commercially available compounds, already have found useful applications.

The isopropyl phenols are now produced in three grades: o-isopropyl phenol, a relatively pure *ortho* isomer; m,p-isopropyl phenol, a close-boiling mixture of the *meta* and *para* isomers; and diisopropyl phenol, a mixture of the dialkylated phenols.

The compounds are produced in commercial quantities by Koppers at its Oil



HEYDEN FORMALDEHYDE

C. P. Quality in Tank Car Quantities

Purity of raw materials—whether in laboratory or plant—is the surest way to high quality products. Heyden Formaldehyde has for years been recognized as a standard of highest purity and uniformity in the manufacture of many diversified products—urea resins and textile chemicals—protective coatings and embalming fluids. Wherever C.P. quality may make the difference between “excellent” and just “satisfactory,” Heyden Formaldehyde is the logical choice.

In tank cars or in bottles, Heyden Formaldehyde is a clear, colorless solution free of impurities which might cause residual foreign odor or discoloration. Produced under rigid laboratory control from C.P. raw materials, it assures uniform yields and high quality. Available as Formaldehyde Solution U.S.P. or as Methanol-free Formaldehyde, it assays not less than 37% by weight.

Shipped in tank cars, tank trucks, drums, carboys and bottles.

**FORMALDEHYDE • PARAFORMALDEHYDE
HEXAMETHYLENETETRAMINE**

Technical bulletins on the use and handling of Formaldehyde and its derivatives will be mailed promptly upon request on company letterhead.

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Benzaldehyde • Benzoates • Benzoic Acid • Benzyl Chloride • Bromides
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Hexamethylenetetramine • M. D. A. (Methylene Disalicylic Acid)
Paraformaldehyde • Parahydroxybenzoates • Penicillin
Pentaerythritols • Salicylates • Salicylic Acid • Streptomycin

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WE'VE DONE IT FOR DETERGENT MAKERS

*W*ITH fragrance playing so vital a role in the success of soaps and sanitary chemicals, it is no surprise that the manufacturers of liquid and powdered detergents—latest and lustiest of the modern home cleaning aids—are seeking a like means of gaining favor and advantage over their competitors. Already, certain leading producers have found that the efficient and *pleasantly scented* detergent enjoys larger repeat sales than the unscented product whose appeal rests upon cleansing effectiveness alone. On the basis of our laboratory's successful activity in the broad fields of technical deodorization and perfuming, it has been our privilege to work with detergent manufacturers in developing odors appropriate to their needs and compatible with their limits of cost—which suggests that

PERHAPS WE CAN DO IT FOR YOU!

Yours may or may not be a problem of odorizing for added sales appeal . . . it may be one of odor masking for improvement of unpleasant working conditions with consequent betterment of employee efficiency and morale. Or it might be one of using aromatic principles to counteract or neutralize the presence of offensive chemical by-odors at certain stages of your product's processing. In any case, if you are faced with a problem involving odor, we urge you to forward the salient details to our Technical Perfume Division and let them apply their years of practical experience to finding a satisfactory solution.

FRITZSCHE
Brothers, Inc.

PORT AUTHORITY BUILDING, 76 NINTH AVENUE, NEW YORK 11, N. Y.

BRANCH OFFICES and *STOCKS: Atlanta, Ga., *Boston, Mass., *Chicago, Ill., Cincinnati, O., Cleveland, O., Dallas, Tex., Detroit, Mich., *Los Angeles, Calif., Philadelphia, Pa., San Francisco, Calif., *St. Louis, Mo., *Toronto, Canada and *Mexico, D. F.
FACTORY: Clifton, N. J.



Est. 1871

City, Pa., plant. Manufactured by chemical synthesis rather than by refining of coal tar or byproduct materials, it is possible to expand many times the production of these materials. Their potential availability in large quantities will make them valuable for many applications not open to the cresols and xylenols, the supply of which is limited by the amount of coal tar available to the coal-tar refiners.

The properties and chemical reactivity of the isopropyl phenols are somewhat similar to those of the corresponding cresol isomers. The physical properties of the pure isomers are as follows:

	<i>Ortho</i>	<i>Meta</i>	<i>Para</i>
Freezing point	15.8° C.	25.9° C.	63.2° C.
B.P.: 760 mm Hg.	214.1° C.	228.6° C.	228.5° C.
B.P.: 20 mm Hg.	122.° C.	127.° C.	127.° C.
Sol. in 10% NaOH	Complete	Complete	Complete

The chemical reactivity of the isopropyl phenols is typical of the lower mono-alkyl phenols. The phenolic hydroxyl group may undergo reactions such as esterification and etherification; the aromatic nucleus is subject to reactions such as halogenation, nitration, alkylation, aldehyde condensation, and hydrogenation. Phosphate esters of the isopropyl phenols can be prepared by reaction with phosphorus oxychloride, and derivatives such as dinitro-ortho-isopropyl phenol can be prepared by reaction with nitric acid.

Although previously available to research workers only in limited quantities, the isopropyl phenols already have been found to have several promising uses. The alkyl phenols themselves are powerful high-boiling solvents which are valuable for certain wire-coating compositions and for use in engine cleaning formulations. The phosphate esters offer promise as plasticizers for vinyl resins and related materials. The dinitro derivative of the ortho isomer has definite value as a selective herbicide and insecticide, and offers the special advantage that the sodium salt is extremely soluble in water.

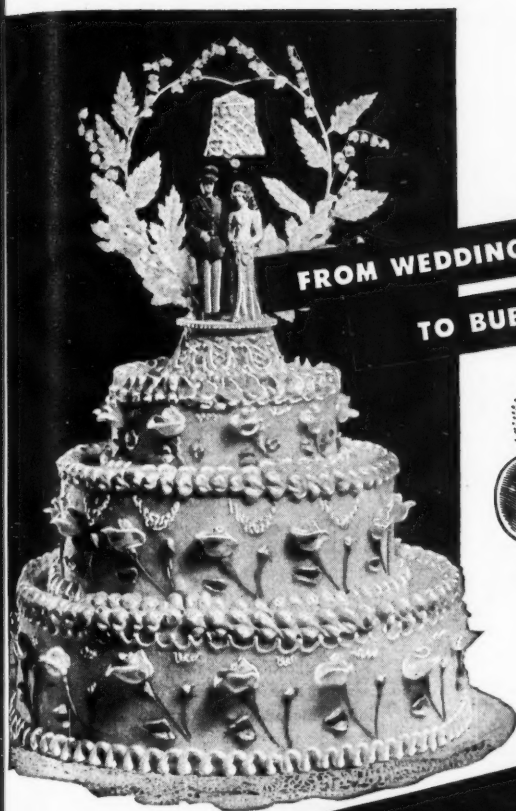
Other uses for which the isopropyl phenols are suggested include the preparation of lubricating oil additives, the manufacture of phenolic surface-coating resins, and the production of rubber processing chemicals.

Samples of the several grades of the isopropyl phenols are now available to research and development chemists.

Vinyl Stabilizers NP 905

Ferro stabilizers prevent deterioration of vinyls by heat and light.

A new and complete line of heat and light stabilizers for polyvinyl chloride and associated copolymers is being offered by Ferro Chemical Corp. These stabilizers have been designed for ease of handling and incorporation in plastics processing, and impart excellent clarity and stability to clear stock at moderate cost. They are equally effective in pigmented



FROM WEDDING CAKE
TO BUBBLE GUM



*Nothing takes the place
of Glycerine*

Because—Glycerine is a wholesome humectant . . . retaining freshness, improving texture in cakes and breads . . . avoiding graining in icings, toppings, marshmallow fillings . . . preventing hardening in jams, jellies, candies, chewing gums.

Because—Glycerine is a food . . . digesting normally to supply energy in much the same way as sugars and fats.

Because—Glycerine is a solvent and blending agent . . . improving the palatability, sharpening the distinctive tastes of flavoring preparations. Glycerine is a sweetening agent, a preservative. Its well-proved versatility can be matched by no other product.

That's why in the food industry—and in *all* industry—for today's products—and for tomorrow's—*Nothing takes the place of glycerine!*

GLYCERINE PRODUCERS' ASSOCIATION

295 Madison Avenue
NEW YORK 17, NEW YORK

Technical GLYCERINE NEWS

COMPRESSED FOODS THAT ARE FRIABLE.

Major problem of compressed food manufacturers is friability. One answer is the use of a small quantity of glycerine prior to compression. The glycerine is said to produce a firm product which can be easily broken when ready for use. (F-1)

★ ★ ★

A NON-TOXIC REFRIGERANT. A refrigerant mixture, particularly suited for use with foodstuffs because it has no objectionable taste and is edible, may be prepared from glycerine and water. (F-2)

★ ★ ★

NEW SUBSTITUTE FOR CORKS. Closures for foodstuffs may soon be made with a new cork substitute in which glycerine is an essential ingredient. The new product is claimed to have bulk density and resilience comparable to natural cork. (F-3)

★ ★ ★

GLYCEROL VISCOSITIES TABLE AVAILABLE. Miner Laboratories, headquarters for the Glycerine Producers' Association program of glycerine research, has prepared a table of viscosities of glycerol in aqueous solution from 0 to 100 per cent, at from 0 to 100 degrees C. You can obtain your copy by checking item F-4 on the coupon below. (F-4)

★ ★ ★

SECRET OF NEW QUICK-METHOD CAKES. The potent ingredient in the new quick-method cakes is a shortening containing a glycerine compound. This shortening makes possible the use of more sugar and milk to improve the cake. (F-5)

★ ★ ★

PLANT SAFETY HINT. If your workers use safety goggles, glycerine is a must. It's one of the best anti-fogging agents—and it's a good lens cleaner, too. (F-6)

GLYCERINE PRODUCERS' ASSOCIATION, DEPT. 3
295 MADISON AVENUE
NEW YORK 17, N. Y.

I should like to receive more information on the source
of the items appearing in *Technical Glycerine News*.
I have checked below those items which interest me.

☐ F-1 ☐ F-2 ☐ F-3 ☐ F-4 ☐ F-5 ☐ F-6

NAME.....

COMPANY.....

ADDRESS.....

INDOPOL H-300

a highly viscous, non-drying, light colored synthetic hydrocarbon product

*for adhesives
rubber goods
mastics
paper products
tape*

Available in seven grades

Brand Name	Indopol L-100	Indopol H-35	Indopol H-100	Indopol H-300
Viscosity 210° F., Saybolt sec. . . .	93.8	377	1040	3000
Specific gravity 60°/60° F. . . . .	.854	.871	.881	.894
Color, NPA	2	2	2	3
Pour Point (ASTM) °F.	-25	0	20	35

Additional grades, and their Saybolt viscosities at 210° F., are L-10 (40.6 sec.), L-50 (68.2 sec.) and H-50 (540 sec.).

INDOIL CHEMICAL COMPANY
910 South Michigan Avenue
Chicago 80, Illinois



stocks and exhibit little or no reaction with pigments.

The efficiency of Ferro stabilizers has been thoroughly tested in numerous resin formulations using a wide variety of combinations and concentrations to obtain optimum ratios.

Manufacturers of stock containing aluminum pigments will be interested to know that Ferro Stabilizers No. 121 and No. 221 have no detrimental effects on the leafing properties of the pigments.

Coating Vehicle NP 906

A polyamine-resin formulation improves qualities of acidic coatings, inks, etc.

Some of Hilton-Davis Chemical Co.'s flushed colors are now being flushed with a new patented vehicle.

The new vehicle is a polyamine resinous composition. Inks formulated with acidic resins react to the polyamine substances to make salt-resin compositions that provide improved pigment-wetting properties, better viscous stability, and better solubility characteristics.

It is claimed that the invention will save considerable expense to users of printing inks, since, without the new vehicle, inks tended to corrode equipment and to thicken and become heavy in body and eventually even to coagulate into heavy liver-like masses.

The improved characteristics may be obtained in any type of acidic resin-containing coating or printing ink. These include drying-oil type inks and varnishes modified with polybasic acid resins; rotogravure type varnishes and inks containing a solution of polybasic acid; and heat-set type inks that are acidic.

Alkyd Resin NP 907

New long-oil soya-type alkyd obviates use of zinc oxide in white enamels.

A new and unique film-forming resin now allows the paint manufacturer to formulate a non-sagging architectural white enamel without using zinc oxide, thus affording excellent color retention in both light and darkness. Obviously, such a formulation avoids the disadvantage of yellowing in the dark which is characteristic of zinc oxide.

This new and radically different resin in the phthalic alkyd class is designated as Duraplex DX-656 by the maker, the Resinous Products Division of Rohm & Haas Co. Although it is a long oil soya type, it has characteristics not available in any of the other Duraplex resins.

•Specifically, it is said to show much greater flexibility and film length over long aging periods than does the usual oxidizing type alkyd resin. In addition, it is said to have excellent gloss retention, fast drying speed and extremely broad compatibility—extending to a wide

of many **DOW** chemicals
serving American Industry

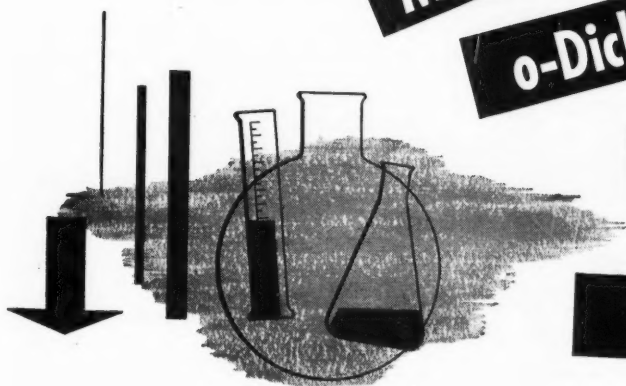
CHLORINATED BENZENES

Monochlorobenzene

o-Dichlorobenzene

p-Dichlorobenzene

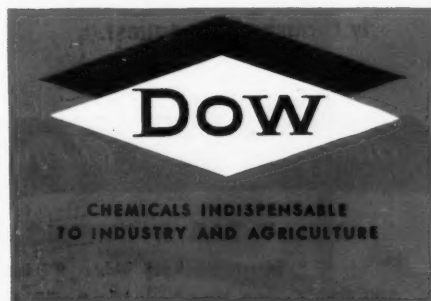
Trichlorobenzene



**THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN**

New York • Boston • Philadelphia • Washington • Cleveland
Detroit • Chicago • St. Louis • Houston • San Francisco
Los Angeles • Seattle

Dow Chemical of Canada, Limited, Toronto, Canada



Reilly Aminopyridines

		2-Aminopyridine ¹	2,6-Diaminopyridine	2-Amino-3-Methylpyridine	2-Amino-4-Methylpyridine	2-Amino-5-Methylpyridine	2-Amino-6-Methylpyridine
							
Molecular Weight	94.06	109.08	108.08	108.08	108.08	108.08	
Boiling Point at 760 m. m.	210.6°C	285°C	221.1°C	230.9°C	227.1°C	214.4°C	
Freezing Point	58.1°C	120.8°C	33.3°C	99.0°C	76.6°C	43.7°C	
Solubility (in 100 grams water @ 20°C)	More than 100 G.	9.9 G.	More than 100 G.	4.1 G.	More than 100 G.	More than 100 G.	
SPECIFICATIONS							
Purity	98% min.	98% min.	95% min.	95% min.	95% min.	95% min.	
Freezing Point	57.2°C min.	119.2°C min.	29.5°C min.	96.0°C min.	73.5°C min.	39.0°C min.	

In keeping with its policy of making available to industry organic chemicals of potential usefulness, Reilly is now producing the six aminopyridines above described.

Perhaps the most important of these products is 2-Aminopyridine, parent compound in the synthesis of important antihistaminics, for relief in distressing allergic conditions, such as hay fever. All of these chemicals are of interest in the pharmaceutical field, and are suggested for investigation in the manufacture of disinfectants, insecticides, plastics, rubber chemicals, wetting agents, additives to lubricants and gasolines, photographic compounds, dyestuffs, and in various organic syntheses.

Further information on any of these products gladly furnished on request.

Reilly Coal Tar Chemicals For Industry

REILLY TAR & CHEMICAL CORPORATION

Merchants Bank Bldg. • Indianapolis 4, Indiana
500 Fifth Avenue, New York 18 • 2513 South Damen Avenue, Chicago 8

range of drying oils, cold cut varnish resins, varnishes, alkyds and urea and malamine resins.

These characteristics have led to its adoption in architectural white enamels, automotive coatings, metal decorating coatings, cloth coatings and metal tube enamels. Its use is indicated in many diverse applications involving great toughness, flexibility and light color coupled with fast air-drying or baking speed.

Powdered Rubber NP 908

Goodrich supplies nitrile rubber in powder form for easy blending.

Hycar OR-15 nitrile rubber in powder form, designed especially for mill and Banbury blending with phenolic resins, is being produced by B. F. Goodrich Chemical Co.

The first finely divided elastomeric material to be commercially available in this country, Hycar OR-15 powder can be successfully dry-blended and processed in an internal mixer in a minimum operation cycle. The development makes economically feasible the manufacture of rubber-phenolic molding compounds with exceptionally high impact resistance.

Hycar OR-15 is a modified acrylonitrile-butadiene copolymer. Supplied heretofore in two basic forms, dry sheet rubber and latex, it is now also available in the new powder form in production quantities.

Core Binder NP 909

Cyanamid introduces pure resin binder for foundry sand cores.

The Plastics Department of American Cyanamid Co. has recently introduced a new synthetic resin developed for the binding of sand cores. This new resin will be marketed under the trade-name of Cycor 151.

It is a neat, thermosetting resin made under carefully controlled conditions and especially prepared as a water-resistant foundry-core binder. It contains no filler or additives of any kind. The foundry may vary the amount of Cycor 151 and additives to obtain cores with green and baked tensiles, permeability, hardness and collapsibility necessary for the type of casting to be made. Its use also makes possible cleaner, more uniform castings.

Cycor 151 produces water-resistant cores which withstand high humidity and long lay-overs in molds. It can be cured in either conventional or dielectric ovens and allows quick-cured cores for rush jobs. Because Cycor 151 is a pure resin, only small quantities are required. The short baking cycle required increases oven turnover and thus increases production per hour. Cycor 151 gives foundries 33% to 50% faster baking time at baking temperatures of only 350°F. than old-time binders. The excellent collapsibility insures savings in shake-out and cleaning.

You Get Commercial Chemicals with Laboratory Purity . . .

When You Order Hooker Sulfides

With a maximum iron content of only 8PPM in Hooker Sodium Sulfide and only 5PPM in the Sodium Sulphydrate you can understand why we are proud of the purity of these Hooker Sulfides. This minute amount of iron is matched by an especially low amount of other impurities in these Hooker products.

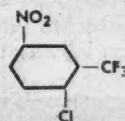
Packaged in the form of small flakes, both products are quickly and completely soluble in water. The clear solution can be used without settling or decanting. For smooth reactions—for good yields without troublesome side reactions from impurities, your safest course is to use Hooker Sulfides.

Advanced manufacturing techniques, carefully controlled operations, carefully selected raw materials account for Hooker's ability to produce these pure sulfides on a commercial basis.

As an added convenience for those who use sodium sulphydrate in large quantities this chemical is also available in liquid form in tank car quantities. Liquid sodium sulphydrate is shipped in concentrations of approximately 37% or 45%. Specifications will be furnished upon request.

Technical Data Sheets and samples will be sent to qualified personnel making requests on their business letterheads.

HOOKER RESEARCH PRESENTS 2-CHLORO-5-NITROBENZOTRIFLUORIDE



Synonym	2-chloro-5-nitrotrifluoromethylbenzene
Molecular Weight	225.56
Freezing Point (l.c.p.)	16.8°C
Boiling Point	230.0°C
Refractive Index n ₂₀ /D	1.5009
Specific Gravity, 25/15.5°C	1.5520

Another new development of Hooker Research in benzotrifluorides is 2-chloro-5-nitrobenzotrifluoride. It is a straw colored, thin, oily liquid. Because this chemical is so new, information available on its uses is limited. Literature does indicate however, its use as an intermediate in the preparation of dyestuffs.

Hooker 2-chloro-5-nitrobenzotrifluoride is at present available in pilot plant quantities.

Those who are interested in investigating the potentials of 2-chloro-5-nitrobenzotrifluoride may obtain samples by writing on their business letterheads. Technical Data sheets giving more complete physical and chemical information are also available.

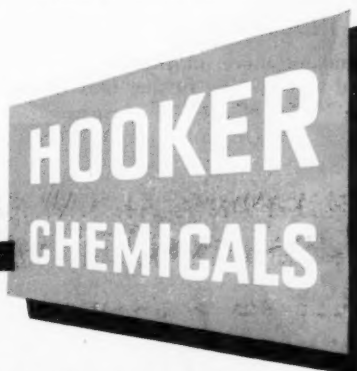
DESCRIPTION	ANALYSIS	USES
SODIUM SULFIDE Na₂S Mol. Wt. 78.1 M. P. 100°C Light buff colored solid in flake form. Rapidly soluble in water; slightly soluble in alcohol; insoluble in ether.	Na ₂ S 60 to 62% NaCl 1.5% Max. Other Na Salts 2.0% Max. Fe 8 ppm Max. Cu, Ni, Cr, Mn, Pb 1 ppm Max. Water of crystallization 36.5 to 34.5%	In unhairing hides and wool pulling; desulfurizing viscose rayon; in manufacture of dyestuffs, chemical intermediates, paper pulp, soap and rubber, as an ingredient of dye liquor for textile dyeing; boiling out linen; ore flotation and metal refining. SHIPPING CONTAINERS Steel drums 90 and 350 lbs. net
SODIUM SULFHYDRATE NaSH (sodium hydrosulfide) Mol. Wt. 56.1 M. P. 55°C Light lemon colored solid in flake form. Completely and rapidly soluble in water, alcohol and ether.	NaSH 70 to 72% Na ₂ S 2.5% Max. NaCl 0.8% Max. Na ₂ SO ₃ and NaHCO ₃ 0.4% Max. Fe5 ppm Max. Cu, Ni, Cr, Mn, Pb 1 ppm Max. Water of crystallization 28 to 26%	In unhairing hides, in desulfurizing viscose rayon; in preparation of dyestuffs and other organic chemicals such as thioamides, thiourea, thioglycolic acid, thio- and dithiobenzoic acids, sodium thiosulfate. SHIPPING CONTAINERS Flake: Lacquer-lined steel drums 90; 350 lbs. net Liquid: Tank Cars

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*SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM TETRASULFIDE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

May, 1949

797

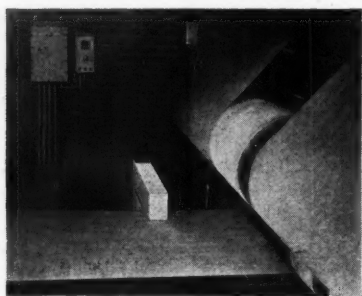
NEW EQUIPMENT

Thickness Gage

QB781

General Electric's Special Products Division is producing a new instrument to measure continuously the thickness of sheet materials moving along a conveyor.

The Beta-Ray thickness gage, by measuring absorption, actually indicates the mass per unit area of the material under test, but the equipment can be calibrated



in terms of thickness. The new gage will find application in monitoring the thickness of metal foils, such as aluminum, copper, tin, brass, and steel and it can be used with plastics, textiles, rubber, and other sheet materials, especially those which cannot be contacted while in processing.

In operation, the new gage measures the deviation from a chosen setting by registering the amount of beta-rays (high-speed electrons emitted by certain radio-active substances) which the material under test absorbs. The source of beta-rays in the gage is radioactive strontium 90. Those rays unabsorbed by the material passing through the gaging head are gathered in an ionization chamber. An attenuated 90-cycle signal is added in phase opposition to cancel the signal from

the ionization chamber. The attenuator voltage, therefore, is a measure of the ionization chamber voltage, and of the amount of material in the beta-ray beam.

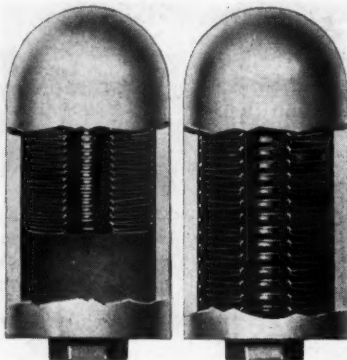
Operating on a power supply of 100-125 volts, 60 cycles, ± 0.3 cycles, power consumption of the gage is about 150 watts. Accuracy is ± 2 per cent or better between normal periods of calibration, while drift is not more than 1 per cent per hour after a 30 minute warm-up period. Under normal conditions, calibration need not be made oftener than once every four hours.

Water Hammer Arresting Device

QB782

A permanently sealed air chamber, produced by the Wade Mfg. Co. eliminates damaging effects of water hammer.

Spring-operated valves almost always cause water hammer. The sudden surges



of pressure often exceed 800 psi and are a major cause of pump damage, equipment failure and even pipe rupture.

Many plumbing codes require protec-

tion in the form of capped pipe air chambers. Such air spaces soon become water-logged and inoperative. Even when provided with valves or petcocks to permit drainage, frequent service increases maintenance.

The Wade ShokStop provides an air cushion to absorb the "water hammer" pressure impulse, but positively prevents water logging of the air chamber. A metal bellows allows free contraction and expansion of the air sealed within it but prevents all contact between air and water. Thus, the air chamber is continuously effective and provides constant protection against water hammer.

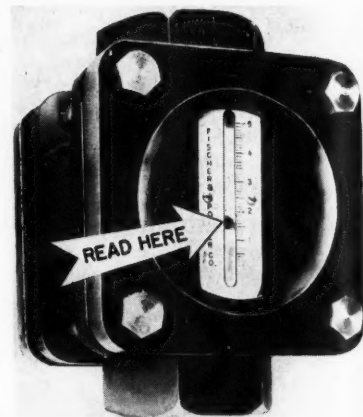
Flow Indicator

QB783

Fischer & Porter Co. has developed a rotameter for use with dark-colored fluids.

The new Magna-Sight flow guide uses the company's standard Bull's Eye body with a fixed diameter orifice at its vertical inlet. A tapered plug is suspended in the fluid stream within the orifice. There is a permanent magnet imbedded in the tapered plug which causes an external steel ball to move against a calibrated flow scale when increasing flow rate causes the plug to rise. The rear enclosure is a heavy Herculite glass window which permits visual observation of the fluid.

It is made in 8 sizes from $\frac{3}{4}$ " to 4" (screwed or flanged) and measures maximum flow rates of 3.5 to 250 gpm. Minimum measurable flow rate for any given



indicator is 1/10 maximum. The Magna-Sight flow guide is made of iron, steel, brass, bronze, and stainless steel.

Oxygen Meter

QB784

The Magno-Therm oxygen meter of Hays Corp. is now in production.

The Magno-Therm operates on an entirely new principle based on the paramagnetic property of oxygen. It continuously analyzes, indicates and records the percentage of oxygen in boiler flue gases and in industrial gases. Gas to be

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (5-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

QB781	QB785	QB789	QB793	LE127
QB782	QB786	QB790	QB794	LE128
QB783	QB787	QB791	LE125	LE129
QB784	QB788	QB792	LE126	LE130

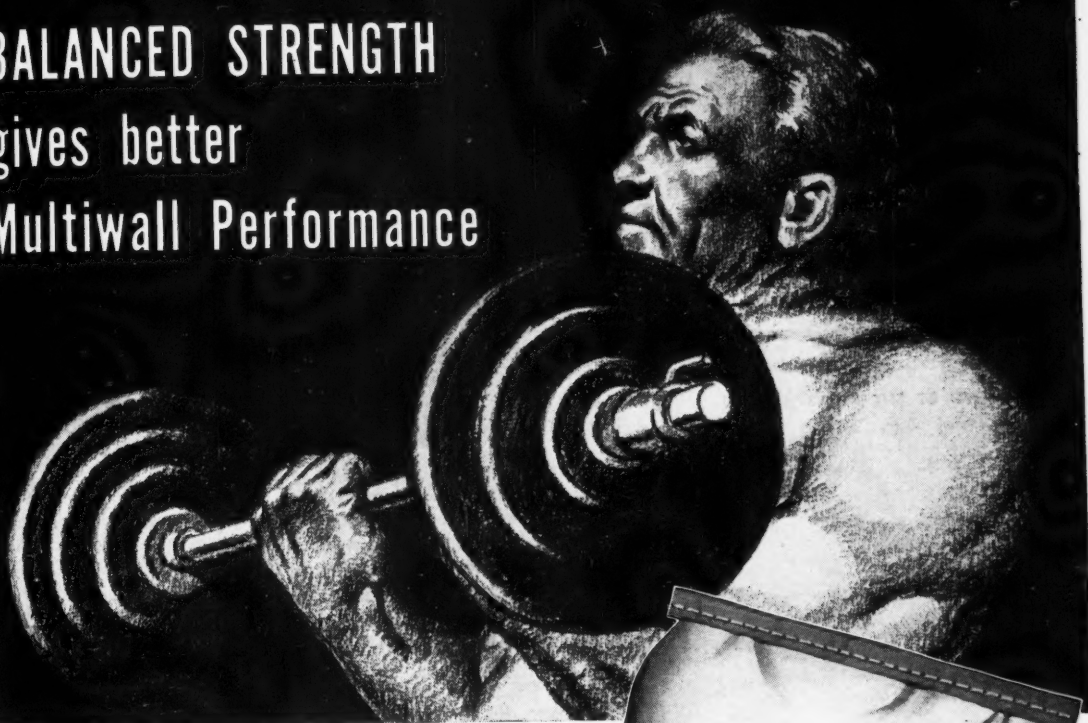
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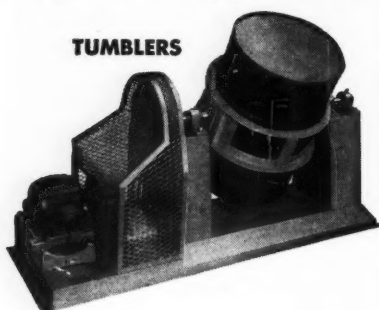
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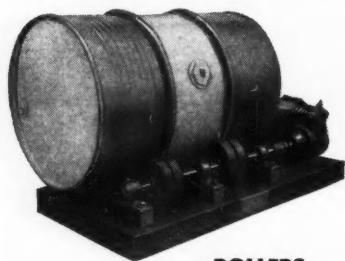
DRUM MIXING EQUIPMENT

Fast, thorough, economical mixing of powders and solutions in your own or suppliers' drums.

TUMBLERS



A decided improvement over the old style "fixed container" tumbler, "U. S." removable drum tumblers permit mixing in suppliers' drums, or in interchangeable customer-built containers. It is only a matter of minutes to place the drum in position and start the tumbler. Variable speed controls. Built in sizes to handle one or two 5, 30 or 55 gallon containers.



ROLLERS

These drum rollers are adjustable. Will roll any round container from a 5 gallon can up to a 55 gallon drum. Standard revolving speed of shaft 144 RPM. Eight 6" rubber-tired wheels will easily handle 1,000 lb. load. Wheels are adjustable on the shaft. Multiple drum rollers to handle up to four drums also are available.

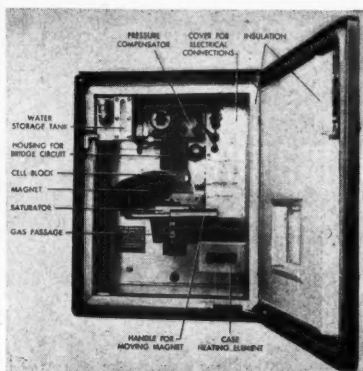
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Akron 9, Ohio

analyzed is passed through a cell block in which there are two cells containing heated resistors. The sample gas diffuses into both cells. A strong magnetic field



from a permanent magnet is directed across one resistor in the measuring cell. The oxygen bearing gas is attracted into the magnetic field (oxygen is paramagnetic) and becomes heated by the hot resistor. The oxygen loses its magnetism as it becomes heated and is forced out of the magnetic field by the cooler, more magnetic oxygen. The cooling effect on the heated resistor is proportional to the magnetism of the gas entering the cell. This changes its electrical resistance and increases the flow of current through it. The change in flow of current is compared with the flow of current in the comparison cell resistor (without a magnetic field) and the difference in resistance is measured by the Hays Acatron electronic type recorder, calibrated to read in percent oxygen.

The measurement is compensated for ambient temperature, barometric pressure and variable moisture content of the gas sample. The presence of hydrocarbon gases and vapors does not affect the accuracy of the instrument.

• QB785 Superior Electric Co., is now producing a portable *Stabiline voltage regulator*, IE51002, with a rated output of 0 to 250 volt-amperes. The regulator is completely electronic with no moving parts. Maximum change in output voltage due to either input voltage or load current variations is stated as not exceeding $\pm 0.25\%$. For input changes only, the change in output voltage is said not to exceed $\pm 0.1\%$, and speed of correction is said to be from 3 to 6 cycles.

• QB786 For viscous materials which congeal or harden and will not flow at ordinary temperatures, Everlasting Valve Co. has developed a *steam jacketed valve* based on the same mechanical principles that are used on the standard Everlasting valves.

These valves are available in 2-, 3-, and 4-inch sizes, for 125 psi line pressure and 125 psi jacket pressure.

• QB787 Allis-Chalmers has added a new all-metal *Low-Head gyrator sifter* to its regular line of standard floor-mounted and reed-suspended sifters.

All riveted joints on the new sifter are gasket-sealed eliminating all unnecessary cracks and crevices. The sifter box and sieves—each sifter holds four to seven—can be easily cleaned with air or water. A unique device eliminates the use of tacks for attaching cloth to the metal frames.

The sifter can be operated on products in excess of 125° F, and is powered by a one-horsepower explosion-proof motor with Texrope drive.

• QB788 A *discharge check valve* has been designed by J. A. Zurn Mfg. Co. that protects against contamination of liquids, fouling of pumps and equipment by surging.

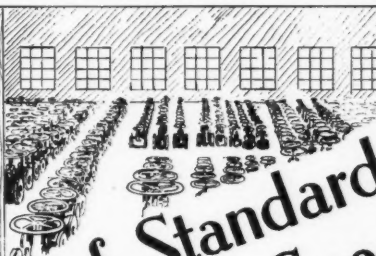
To minimize fouling they have a swing check flap suspended from a full floating pin fulcrum to insure positive full surface contact between ground face of flap and flap seat. The knob in the center of the top surface of the swing check flap contacts the valve body roof at only one point when the swing check flap is wide open. This assures free operation of the swing check flap by preventing it from touching the sides of the valve body. Location of swing check flap in relation



to the interior of valve body provides protection against the possibility of sediment blocking the valve.

Discharge check valves may be operated with or without a manual control or with an extension shaft or flexible cable from an access box. The units are hydrostatically tested. They are available with 180°, 105° or 90° bodies made of cast bronze, steel, semi-steel, cast iron and alloy metals for corrosion resistance.

• QB789 There has been need of a filter that could be cleaned thoroughly by simple manipulation of a few valves instead of opening to remove the leaves for manual cleaning. The new *leaf filter* of Hercules Filter Corp. has the leaves centering on a rotating shaft and provision is



Complete Stocks of Standard Patterns + Special Designs for Special Services = the POWELL LINE



Powell presents a Complete Line of Standard Valves—in Bronze, Iron, Steel, Pure Metals and Special Alloys.* These are of every type and size, and for all pressures and temperatures encountered in the many services for which they are adapted.

But ever-changing methods and processes continually impose new flow control conditions. For these Special Services, Powell Engineers are always ready with Special Designs.

The result is that Powell—and only Powell—makes such a complete line that today there's a Powell Valve specifically adapted to each and every flow control service known to Industry.

Write for information on applications of Powell Valves. And if you have any flow control problems, Powell Engineers will help you solve them.

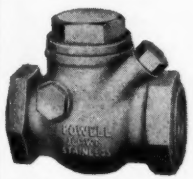


Fig. 1847 — 200-pound Stainless Steel Swing Check Valve. Screwed-in cap and regrindable, renewable disc.

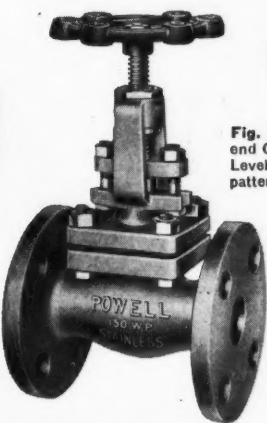


Fig. 1979 — 150-pound Stainless Steel O. S. & Y. Globe Valve with flanged ends.



Fig. 1891 — Flanged end O.S. & Y. Liquid Level Gauge. Offset pattern.



Flush Bottom Tank Valve. Available in two designs: Fig. 2309—disc rises into tank to open; Fig. 2310—disc lowers into body.

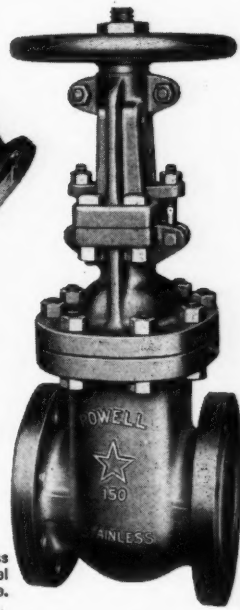


Fig. 1503 S. S. — Class 150-pound Stainless Steel O. S. & Y. Gate Valve.

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are made in the widest range of metals and alloys ever used in making valves.

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- ✓ Delivers gas exactly as received, dry, pure, undiluted.
- ✓ Has less than 1/2 of 1% dead space for quick purging.
- ✓ Will give years of continuous performance without mechanical servicing.

These all add up to the fact that only with a Wiggins Gasholder can you store chemical process gases with

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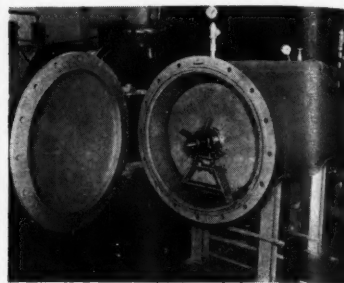
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made for flushing away the sludge and used filter mediums with sprays, without opening the door of the filter at any time.

During the cleaning operation the leaves are rotated slowly and water is sprayed on both sides of the screens, removing



the sludge and exhausted filter mediums, which are drawn off from a sump at the bottom of the filter, for which purpose a motor-driven worm can be provided if the nature and amount of solids makes this desirable. For normal clarification with thin precoat a worm is not needed.

Discharge of filtered materials is through the center shaft which passes through the back of the horizontal tank. The leaves are slid over the discharge pipe, which is perforated to take the discharge from each individual leaf, and the leaves are keyed to the discharge shaft for rotating purposes.

• QB790 A new small model has been added to the line of Cowles dissolvers. Intended for limited production and laboratory use, model 5VT, known as the "Tipup", is equipped with a 3 hp motor with variable speed V-belt drive for



viscosities ranging up to 40,000 centipoises and batch capacities from 2-40 gals.

The Tipup is for use in containers brought to the machine, and the impeller is immersed or removed from the tank by tilting the bridge that carries the impeller, drive and motor. Coil springs serve as both snubbers and boosters to facilitate the tilting.

The motor and starter are rigidly

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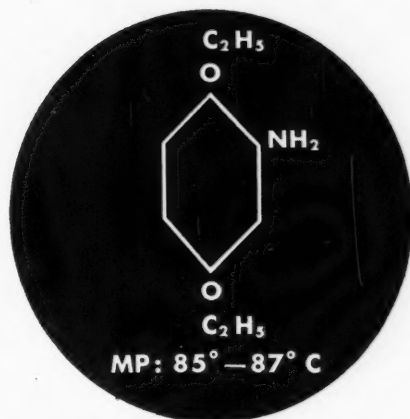
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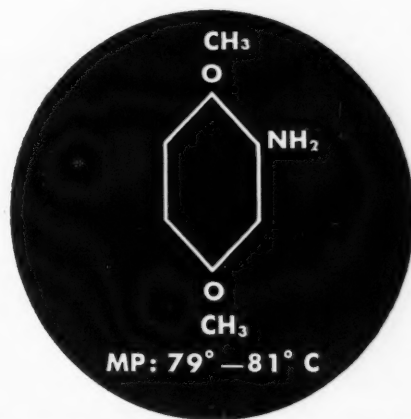
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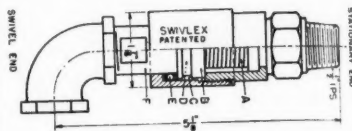
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mounted to the support, while the bridge is attached to four studs to permit horizontal movement for belt adjustment. This permits a wide selection of sheave ratios and speeds, and the use of 4", 6", or 8" impellers.

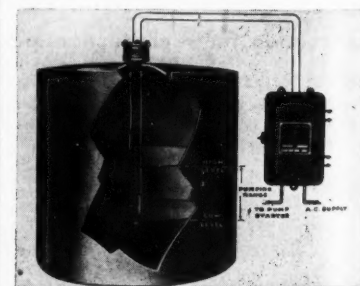
• QB791 Seamlex Co.'s new, patented swivel joint Swivlex is suitable for 400 psi and 600° F. Outstanding operating



features are: 1. Easy swivel due to (a) an internal equalizing chamber which balances the pressures on both sides of the swivel seat, (b) ball bearing which reduces the friction in the housing to a minimum. 2. No maintenance whatsoever, accomplished by (a) all-metal construction which eliminates packings, (b) stainless steel bellows which act as seep-proof, self-adjusting springs that constantly keep the metal-to-metal seat under pre-adjusted pressure to prevent leakage. 3. Fool-proof because of (a) automatic internal stop which prevents accidental abuse in service, (b) invisible lock which prevents unauthorized tampering. Standard sizes are available up to 1" I.D.; larger sizes are in preparation.

• QB792 Photoswitch is producing a new high and low liquid level control, Series 10. Contact with the liquid is made only through stainless steel probe rods. No floats or other moving parts are required in the tank. The control consists of an electrical relay operating from a probe circuit through a transformer and a rectifier—no vacuum tubes are used. Accuracy is independent of temperature and pressure.

Two probe rods, which are wired to the control, project into the tank to the



levels corresponding to the low point where pumping is to start and the high point at which pumping stops. When the level of the liquid in the tank falls below the lower probe, the level control closes the electrical circuit controlling the pump or valve. When the liquid rises to the level of the upper probe, the fluid acts

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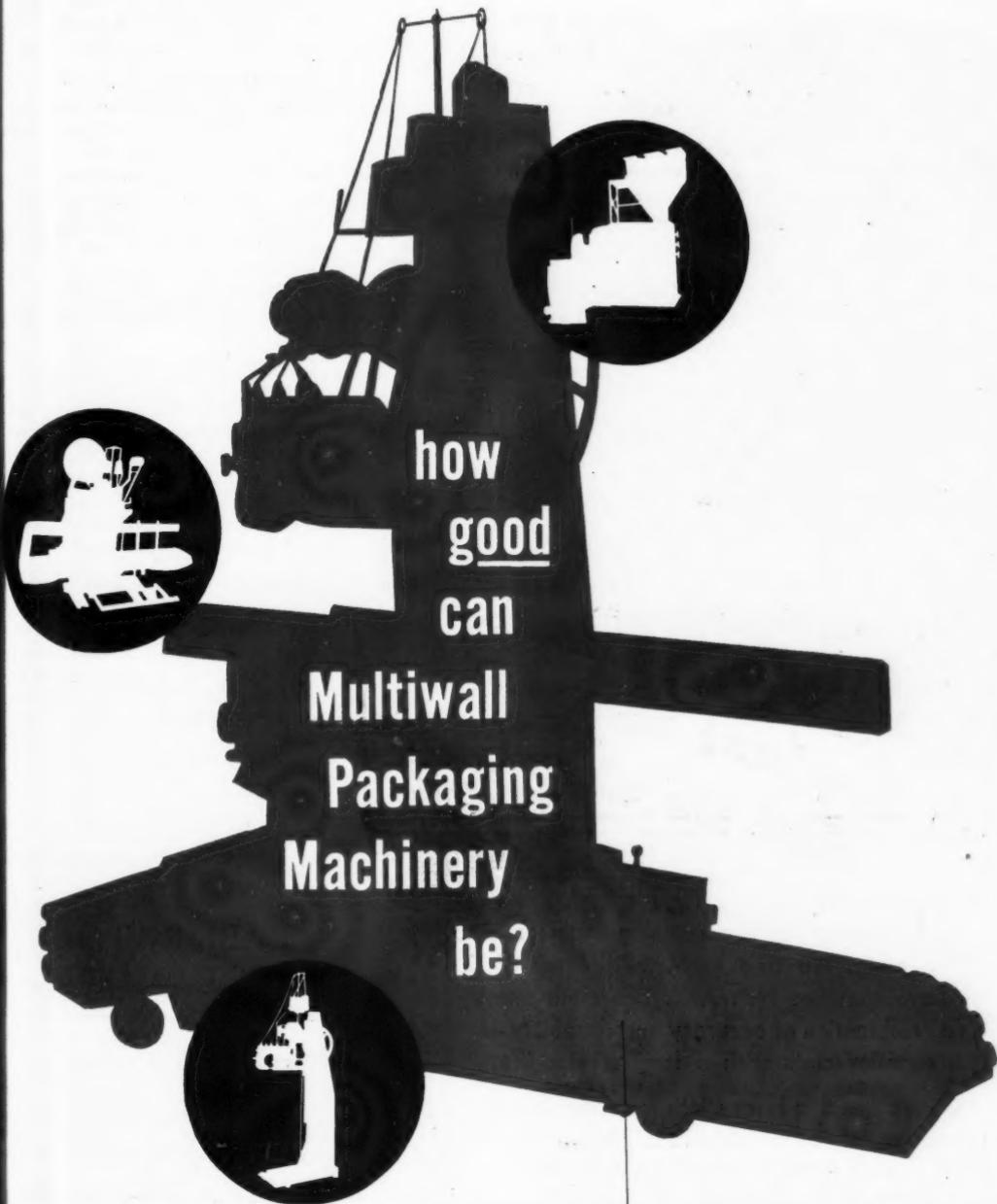
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Newark Metallic Filter Cloth is available in a wide variety of metals and in plain, twill, dutch, double dutch, twilled dutch and other weaves. Our wide experience in the processing field is your assurance of the right cloth for your filtration problem.

Samples are available.



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COMPANY

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as a conductor of the minute current at low voltage required for operation of the relay and the central circuit opens.

- QB793 Lightweight, comfortable protection against corrosive chemicals is provided by the new Chemgard acid hood of Mine Safety Appliances Co. It is made of flexible vinyl plastic with a sturdy inner headframe and clear, replaceable vinyl plastic lens. The Chemgard hood is electronically sealed and is attached by covered snap fasteners to a white-coated vulcanized fiber headgear. The adjustable headgear is equipped with chin rest, and pivoted so that the entire assembly may be swung up over the head.

Natural ventilation is provided by baffled air vents at either side of the plastic hood. If required, additional air may be introduced by a compressed air line attached to a fitting at the back of the hood. The vinyl bib section snaps securely at each side, providing comfortable fit around waist and under arms.

- QB794 Safe-control of air power used in mines, chemical plants and other locations exposed to fire hazard, is assured by a new valve designed by Ross Operating Valve Co. This new Ross safety valve is actuated by a pilot valve which can be hand, foot, or cam operated and eliminates the necessity for safeguarding against electrical hazards. The new valve is available in straightway and three-way models both of which are remotely controlled and can, of course, be set up in series.

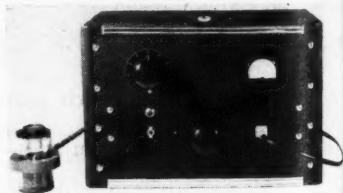
LABORATORY EQUIPMENT

Ultrasonic Generator

LE125

A new type clinical-laboratory ultrasonic generator has recently been developed by Ultrasonic Engineering Co.

The principal feature of the new equipment is the special convertible "transducer" for transmitting the high-frequency vibrations to the material under treatment. The transducer is connected to the



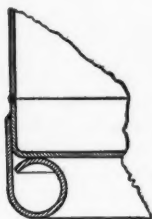
generating unit by a coaxial cable carrying low-voltage (less than 100 volts) high-frequency current.

The base of the transducer comprises



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The special, formed Hackney welded chime construction provides a smooth bottom which may be easily and positively cleaned. Thus, its advantages of cleaning and sanitation are important for the shipment of many chemicals and foods.



These Hackney Straight Side Drums are masterpieces in attractive stainless steel—that stable metal so justly famous for its long life and resistance to corrosion. Exceptional light weight and adequate strength, too, are features of this new container. In design and construction, Hackney Stainless Steel Drums are everything a shipper could desire.

The head is completely removable—making emptying and cleaning exceedingly easy. Your choice of two closures—the famous quick-acting Toggle-tite and a bolt-type closure. Interiors are crack- and crevice-free—there is no place for foreign matter to lodge.

Hackney Stainless Steel Drums are absolutely liquid-tight—no chance for leakage, in or out. They are returnable containers, promising the shipper many years of low-cost service. *Write for full details.*

Hackney Removable Head Seamless Aluminum Bilged Barrels



Aluminum, by its very nature, is friendly to food. That's why these Hackney Barrels are such ideal containers for these and other types of products. Design and manufacture make this barrel a lightweight, sturdy, economical container.

Hackney Drums and Barrels also in mild steel.



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Amber colored liquid.

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°C. 764 mm. Hg. 175-7

Specific Gravity (20/20°C.) 1.136

Flash Point (open cup) °C. 75

Vapor Pressure 55.5°C., mm. Hg. 5.5

As a Solvent: Furfuryl Alcohol (FA) is miscible with water, chloroform, ether, coal tar solvents, and non-paraffinic hydrocarbon solvents; dissolves nitrocellulose, dyes and many resins (both synthetic and natural).

As a Resin Former: FA is reactive with phenolic compounds, formaldehyde, melamine, urea, thiocyanates and with itself, to form resins with varied and valuable properties.

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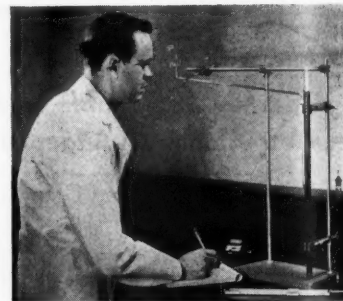
Digby 4-4543 Cable: Austrasia, New York

a transparent Lucite tube, surrounded by a ring containing the primary winding of the step-up Tesla coil, from which a handle projects, with the connecting cable leading in through it. Inside the tube is the secondary winding of the step-up coil. The crystal is mounted above the secondary coil upon nylon rods, between Bakelite and glass discs. The tube is closed by a cap containing a Bakelite diaphragm 0.01 in. thick, mechanically connected with the vibrating crystal by oil which fills the entire assembly.

A second Lucite tube is provided, which may be screwed to the top of the base assembly and filled with oil, into which a test tube or other vessel containing either solid or liquid material to be treated may be immersed.

The generating unit, operated by standard 115-volt, 60-cycle current, uses full-wave rectification with adequate filtering. The self-excited oscillator is coupled to the crystal circuit, and is frequency-controlled by it. Thus the frequency of the oscillator is prevented from drifting out of phase with the natural period of the crystal.

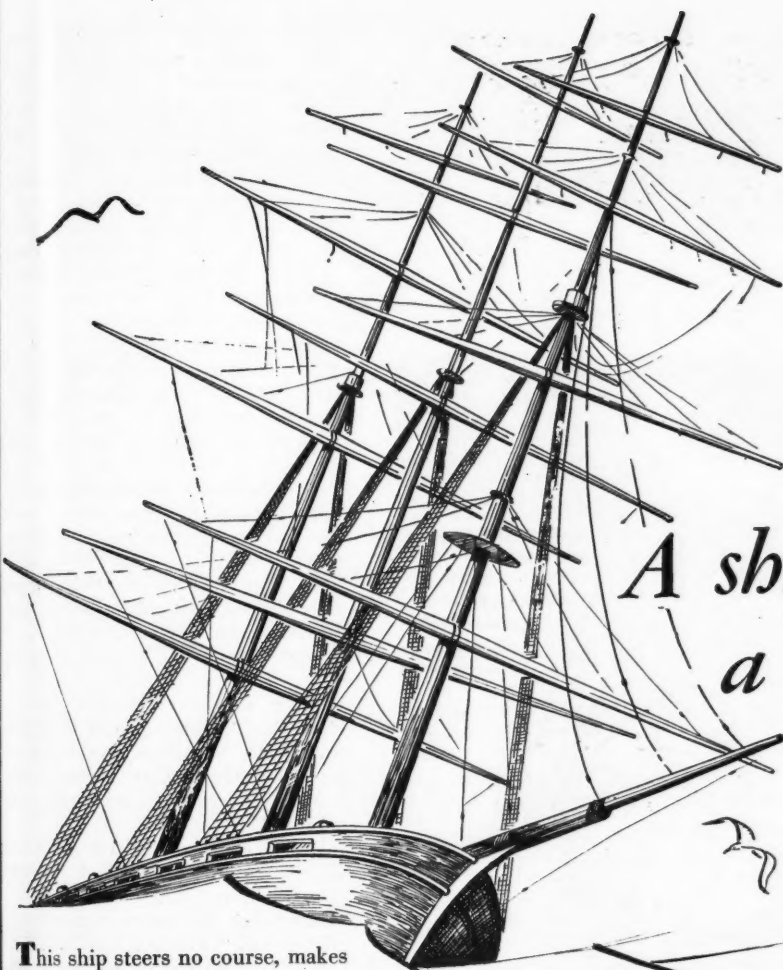
• LE126 The new Fisher-Dotts particle size apparatus measures particle size distribution of granular materials in dispersion mediums ranging from dilute suspensions to concentrated emulsions. (It is also possible to examine liquids in emulsified suspensions.) The apparatus



includes a calibrated micromanometer and sedimentation tube.

As particles settle in the sedimentation tube, the pressure exerted on the liquid in the side-arm decreases and the liquid level in the micromanometer changes. The measurement of the rate of this change provides the basis for the calculations necessary to determine the particle size distribution. The instrument is suitable for use in any case where Stoke's law is applicable. The range of the apparatus is from 1 micron up.

• LE127 The Instron tensile tester, makes possible the accurate load-elongation measurements of plastic and textile materials, wire, paper, rubber and adhesives is being produced by the Instron Eng'g. Corp. Full scale load range of the unit



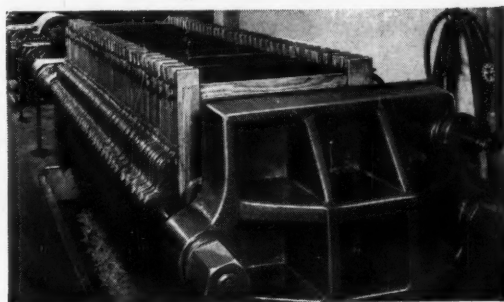
A ship without a sail...

This ship steers no course, makes no port tonight. For, though there's wind in the rigging, there's no sail to catch it. A sailing ship, however taut the crew, logs little headway without sails—set and trimmed for maximum efficiency.

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extends from 2 grams up to 5,000 pounds, and a choice of jaw speeds is incorporated ranging from 0.02 to 20" per minute.

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- LE128 A new portable geiger counter, Model 102, is now available from Precision Radiation Instruments Co. to measure low energy beta particles and alpha particles as well as gamma and x-ray radiations.

The new meter contains a thin end mica window counter with a 1.5 mg/cm² window. This enables it to detect Carbon 14 and other radio-active tracers. The tube is self quenching with a geiger threshold at 825 plus or minus 25 volts and a 200 volt plateau.

The tube is mounted inside a specially designed probe which enables the meter to distinguish between alpha, beta, and gamma radiations. The entire probe assembly and weatherproof cable is mounted on a box 5¼ x 6½ x 4½ inches and weighs about 7 pounds.

- LE129 Electro-Therm, Inc., is producing a new line of electric immersion heating units for use in contact with sulphuric acid solutions (up to 25% boiling; in all concentrations up to 176°F.) and other highly corrosive acids. Rated at from 200 to 5000 watts and from 115 to 550 volts, the new units have sheaths of Carpenter Stainless Steel No. 20.

- LE130 Direct and accurate readings to the fourth decimal place, without the possibility of an error, are assured with the new Visigram device for analytical balances, manufactured by Volland & Sons, Inc.

Older chain-type balances used the chain to give a reading of weights below 0.1 mg. by using a vernier. In the Visigram a Veeder-Root counter gives the reading directly without the inconvenience of interpolation.

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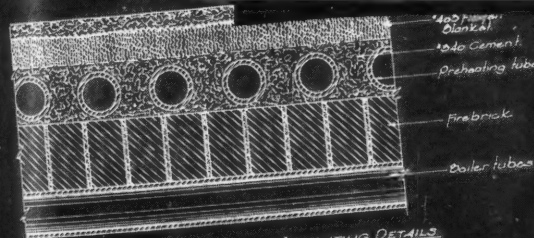
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PACKAGING & SHIPPING

by T. PAT CALLAHAN

Production Record for Railroad Car Company

Improved and accelerated production methods and continuous modernization of plants are bearing fruit for the American Car and Foundry Co. During March ACF produced 3,133 railroad cars, an all-time high for any single railroad equipment manufacturer since the year 1930. Of the total, 2,995 units were domestic freight cars, 85 were for export purposes, and 53 were passenger cars for domestic service.

The existing all-time record, also established by American Car and Foundry Co. in April, 1930, was a total of 3,264 railroad cars of various descriptions.

Snap-on Spout Simplifies Pouring of Liquids

A snap-on pouring spout with a versatile feature which permits it to be used on almost any size metal liquid-pouring container, drum or glass jug is being marketed by Abbott Industries Co., New York City. It is manufactured from precolored colored metal stock as well as aluminum, with an adjustable tab section in the area which fits over the neck opening of a container. This tab section can be pushed backward or forward so that the spout snaps on almost any neck or mouth opening of liquid pouring containers from a 1"



diameter to a 1 3/4" diameter. It therefore can be used on most metal containers from a quart can to a 55-gallon steel drum, as well as on 1/2 gallon and gallon glass jugs. It will fit both screw type and cork type containers.

It is simple to put on and adjust and may be used repeatedly on different type containers, eliminating use of a funnel. For use on bottles the spout section is tilted upwards at a sharp angle.

The spout can also be used on open end pipes, faucets or spigots from 1" to 1 3/4" outside diameter to direct the flow of liquids by simply pressing up the spout

section so that it is even with the pipe opening.

Pennsalt Adopts New Container for Cements

A new composite container, designed to insure the maintenance of high quality through extended storage periods, has



been adopted by the Special Chemicals Division of Pennsylvania Salt Manufacturing Co. for its corrosion-resistant synthetic resin-type cement powders.

Described as a marked improvement over other type drums when large quantities of the Pennsalt resin cement powders are to be stored after having been opened, the basic container is known as the Leverpak Drum. It is manufactured by the Container Company Division of Continental Can Co., Inc.

To meet Pennsalt's requirements, the inside of the fiber drum is coated with plastic wax. This, in turn, is protected by a polyethylene bag liner .002 of an inch thick. The cement is poured into the bag.

An airtight condition is obtained by a lever lock device that clamps the metal top, also covered with polyethylene, to the drum.

For the present, Pennsalt is using these drums for its cements in 15-gallon and 41-gallon sizes.

Polyethylene Bags For Carbon Black

A new container for packaging and shipping carbon black in bags has been developed by Witco Chemical Co. through the

use of polyethylene bags tied with a polyethylene cord. The polyethylene sheeting used in producing these bags was .003 gauge.

The advantage of this type of bag is that, in preparing the rubber mix, the bag and its contents can be thrown into the Banbury where, at a temperature of 200°, the polyethylene disintegrates and completely disappears. Paper bag disposal as well as the dusting problem which is encountered in emptying the carbon black from the bag are thus eliminated.

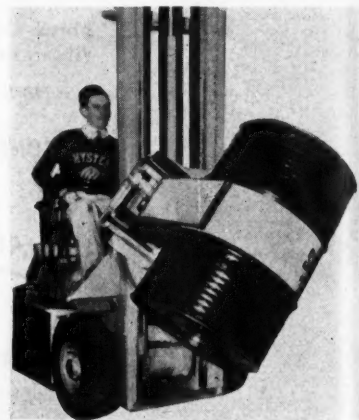
Another advantage is that these bags are waterproof and therefore any moisture which may come in contact with the bag does not affect its contents.

It has been demonstrated that these bags stand up under shipping conditions in a very satisfactory manner. The polyethylene bags are very light, weighing approximately three ounces each. The packaging may be either in 25 pound or 50 pound bags, net weight.

Attachment for Dumping Lift Truck Loads

An attachment, called the Revolving Apron, which makes possible the turning over or dumping of lift truck loads by an hydraulic mechanism is now available for the Hyster "20" and "40" (2,000 and 4,000 pound capacity) lift trucks manufactured by the Hyster Co., Portland, Ore., and Peoria, Ill. Hydraulically controlled, a revolving head or turn-table on which conventional fork arms are mounted, turns 180 degrees in either direction from the center. Capacity loads of 1,725 pounds with the "20" and 3,650 pounds with the "40" may be efficiently turned with the device.

An important feature of the Revolving



Apron is that a special Load-Grab unit may be mounted on the turn-table of the "20" lift truck in place of regular fork arms. The Load-Grab, an attachment which side-squeezes loads with sufficient pressure to lift securely without the need of any type of pallet, has a number of optional, special-purpose arms which may be substituted for the standard load arms

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St. Regis service moved in, too, with St. Regis men assisting the complex operation of salvage and re-shipment.

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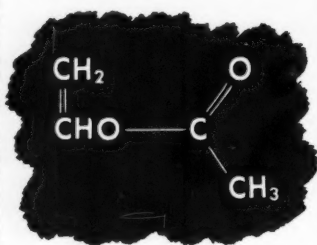
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Containers: —

410 lb. drums

62,500 lb. tank cars

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as desired. These particularized arms, designed for handling such unit packages as bales, boxes, crates, drums, barrels, cartons, etc., when mounted on the Revolving Apron produce a great variety of combinations for the lifting, turning and tiering of many kinds of materials.

Load capacity of the Apron in conjunction with the special Load-Grab unit is 1,400 pounds.

Machine Piles and Flattens Bags

The Flexoveyor Manufacturing Co., Denver, Colorado, has introduced its Flexoveyor Piler and Ban Flatteners which is designed to flatten and elevate bags



in one operation. This unit is available in sizes to elevate from 12 to 20 feet. The Piler and Flatteners combination is effective in plants which need to make the most use of storage room. The unit is completely portable, and is available with power-driven mechanism for self-propulsion.

Newly-packed bags handled by the piler-flattener are made smooth, less bulky, and may be piled more easily in less warehouse space. As the bag is conveyed through the unit, the kneading and pressing action of the top hugger boom eliminates air from the bag, producing a smooth, well-shaped, easily-handled bag.

ICC Regulations Amended

Certain editorial changes in the Interstate Commerce Commission Regulations for the transportation of explosives and other dangerous articles have been promulgated to make the material within the Regulations conform to the scope and style of the Code of Federal Regulations, 1949 Edition, as prescribed by the Regulations of the Administrative Committee of the Federal Register and approved by the President effective October 12, 1948 (13 F.R. 5829). Future amendments to the regulations will conform to a new numbering system in which the number to the left of the decimal point is the Part number assigned in the Code of Federal Regulations, and the number to the right of the decimal point is the section

or paragraph number presently assigned by the Interstate Commerce Commission.

This editorial change will not be involved as the paragraphs already in the regulations will be changed only to the extent of a Part number assigned in the Code of Federal Regulations preceding the decimal point. For example, Subpart C of the present regulations—Inflammable (flammable) liquids—now covered in Sections 100 to 119, are redesignated as SS 73.100 to 73.119.

Effective March 7, 1949, the following amendments to the Interstate Commerce Commission Regulations which are of particular interest to the chemical industries were promulgated.

Section 73.108 (formerly sec. 108 (g)) is amended to read as follows:

(g) Spec. 104A, 104A-W, 105A300, 105A300-W, 105A400, 105A400-W, 105A500, 105A500-W, 105A600, 105A600-W, or ARA-IV-A.-Tank cars. See note 1, S 73.110 (c) (8). (See S 73.423 for shipping instructions.)

The purpose of this amendment is to provide for substitution of cars constructed to more rigid specifications than those now authorized for ethyl chloride.

Section 73.109 (formerly sec. 109 (f)) is amended to read as follows:

(f) Spec. 104A, 104A-W, 105A300, 105A300-W, 105A400, 105A400-W, 105A500, 105A500-W, 105A600, 105A600-W, or ARA-IV-A.-Tank Cars. See Note 1, S 73.110 (c) (8). (See S 73.423 for shipping instructions.)

The purpose of this amendment is to provide for substitution of cars constructed to more rigid specifications than those now authorized for ethylene oxide.

Section 73.110 (formerly sec. 110 (a) (3)) is amended to read as follows:

(a) (3) Spec. 5, 5A, 5B, 5C, 5G, or 5M.—Metal barrels or drums with openings not exceeding 2.3 inches in diameter.

The purpose of this amendment is to provide an additional container, ICC 5M, for shipments of inflammable liquids.

Section 73.110 (formerly sec. 110 (a) (3)), section 73.110 (formerly sec. 110 (c) (5)), and section 73.110 (formerly sec. 110 (c) (8)) were amended to provide for substitution of cars constructed to more rigid specifications than those now authorized.

Section 73.156 (formerly sec. 156 (a) and (b)) have been amended as follows:

(f) Spec. 21A.—Fiber drums.

The purpose of this amendment is to provide additional safe packing for barium peroxide and to specify proper inside containers for calcium peroxide.

Section 73.163 (formerly sec. 163 note to paragraph (c)) is designated Note 1 and amended, and Note 2 added to read as follows:

Note 1.—Because of the present emergency and until further order of the Commission, spec. 37F metal drums for chlorate of soda, marked for an authorized gross weight of 160 pounds, may be filled to a gross weight not to exceed 180 pounds.

Note 2.—Spec. 37E and 37F metal



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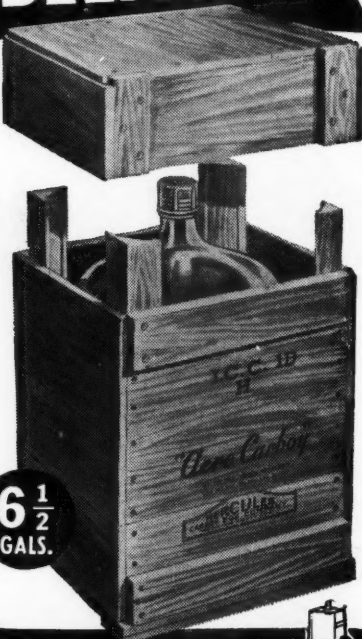
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drums for export service, marked for an authorized gross weight of 160 pounds, must be at least 24 gage metal throughout.

The reason for this amendment is to provide heavier construction in drums of the above type commonly used for the shipment of chlorates.

Section 73.204 (formerly sec. 204 (d)), has been amended as follows:

(d) (1) Spec. 17E, 17H, or 37K.—Metal drums (single-trip).

(d) (2) Spec. 37D, 37E, or 37F.—Metal drums (single-trip). These containers are not authorized for transportation by carriers by water.

The purpose of this amendment is to limit ICC 37D, 37E, and 37F drums to domestic shipments only. In the future these containers are not authorized for transportation by carriers by water.

Section 73.204 (formerly section 204 (e)) is designated (e) (1), and (e) (2) added to read as follows:

(e) (1) Spec. 21A.—Fiber drums with inside metal drums.

(e) (2) Spec. 21A.—Fiber drums, net weight not over 250 pounds; drums must have a metal foil (laminated between two sheets of kraft paper with thermoplastic adhesive) moisture and water barrier wound into the sidewall of the drum and located not more than 2 plies from the interior of drum but not to be wound as the first ply; a metal foil moisture and water barrier must also be present in the fiber or wood heading; exterior of drum sidewall must be protected with a water resistant coating; in addition to the tests prescribed by paragraph 4, Spec. 21A, a drum having been given a 4-foot diagonal bottom chime drop must, after being emptied, withstand complete immersion of the bottom in 6 inches of water for 4 hours without leakage to the interior; drums must not be offered for transportation by carriers by water. The purpose of this amendment is to

provide additional containers for domestic shipments of sodium hydrosulfite.

Section 73.242 (formerly sec. 242 (b)) is amended as follows:

(b) When bottles containing acid or other corrosive liquids are cushioned by incombustible absorbent material and securely packed in tightly closed metal containers, except hydrofluoric acid which must be packed in a container other than a metal container, they may be packed with other articles. This exception does not apply to nitric or perchloric acids, hydrogen peroxide exceeding 52 per cent strength by weight, nitrohydrochloric acid, or nitrohydrochloric acid diluted, which must not be packed in the same outside container with any other article under any circumstances.

The purpose of this amendment is to provide for transportation of nitrohydrochloric acid or nitrohydrochloric acid diluted.

Section 73.245 (formerly section 245) is amended by adding paragraphs (11) and (mm) to read as follows:

(11) Nitrohydrochloric acid.

(mm) Nitrohydrochloric acid diluted.

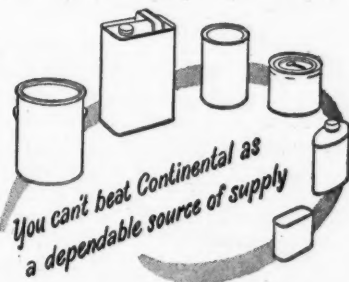
The purpose of this amendment is to include these items in the regulations.

Commodity List section 4 to the List of

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CAN COMPANY

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May, 1949

Explosives and Other Dangerous Articles was amended as follows:

(b) Spec. 3A480, 3E1800, 3B240, or 4B240.

Article	Classed as —	Exemptions and packing (Section references are to Part 73 (formerly Part 3))	Label required if not exempt	Maximum quantity in one outside container by rail express
(Change) Calcium peroxide	Oxy. M.	153, 156	Yellow	100 pounds
(Change) Calcium resinate	Inf. S.	No exemption 166	Yellow	125 pounds
(Change) Calcium resinate, fused	Inf. S.	No exemption 166	Yellow	125 pounds
(Change) Cyclopropane	Inf. G.	302, 303	Red	300 pounds
(Change) Fire extinguishers	Noninf. G.	302	Green	300 pounds
(Change) Guanidine nitrate	Oxy. M.	173, 183	Yellow	100 pounds
(Additions) Dispersant gas, n.o.s.	Noninf. G.	302, 303	Green	300 pounds
(Additions) Nitrohydrochloric acid	Cor. L.	No exemption 278	White	5 pints
(Additions) Nitrohydrochloric acid diluted	Cor. L.	No exemption 278	White	5 pints

The purpose of this amendment was to provide for cyclopropane as a shipping name, and add new commodities.

Section 73.253A (formerly sec. 253A (b)) has been amended as follows:

This amendment provides for inclusion of ICC 3E1800 and 3B240 cylinders for shipment of chlorine trifluoride.

Section 73.261A (formerly sec. 261A (f)) is designated (f)(1) and (f)(2) added to read as follows:

(f)(1) Spec. 5C.—Metal barrels or drums.

(f)(2) Spec. 5G.—Metal barrels or drums with flanges for closures welded in place.

The purpose of this amendment is to provide an additional container for formic acid.

Section 73.278 (sec. 278) has been added to the regulations and reads as follows:

73.278 (a)(1) Nitrohydrochloric acid, which is a mixture of nitric acid not over 1.42 specific gravity and hydrochloric acid not over 1.19 specific gravity in the approximate proportions of one part nitric acid and three parts hydrochloric acid, must be packed in specification containers as follows:

(a)(2) Spec. 15A, 15B, 15C, 16A, or 19A.—Wooden boxes with glass inside containers of not over 5 pints capacity each, individually inclosed in tightly closed metal cans and cushioned therein with sufficient incombustible mineral material.

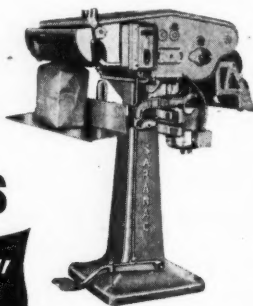
(b)(1) Nitrohydrochloric acid diluted, is a solution of nitrohydrochloric acid as described in (a)(1) which has been diluted to not less than five times the volume of water and must be packed in specification containers as follows:

(b)(2) Spec. 15A, 15B, 15C, 16A, or 19A.—Wooden boxes with glass inside containers of not over 5 pints capacity each, individually inclosed in tightly closed metal cans and cushioned therein with sufficient incombustible mineral material.

(Turn to page 865)

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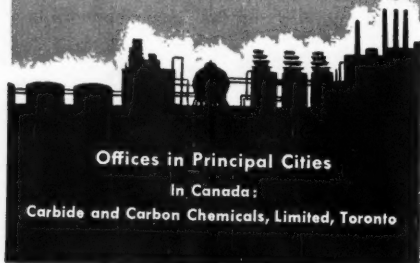
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Tetraethylene Pentamine	$H_2N(C_2H_4NH)_4H$
Aminoethyl Ethanolamine	$H_2NC_2H_4NHC_2H_4OH$

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BOOKLETS & CATALOGS

Chemical

- Paint.**.....B696
Folder describes advantages in application and service of traffic paint with the composition described. 6 pp., Hercules Powder Co.
- Oils.**.....B697
3-page folder gives information regarding lubricating oils with Estax. Watford Chemical Co., Ltd.
- Estax.**.....B698
3-page folder states Estaxes (fatty acid derivatives), of particular interest in textile manufacture, with suggested applications. Watford Chemical Co., Ltd.
- Duraplex.**.....B699
Technical bulletin on the resin, Duraplex DX-656, describes compatibility, outstanding properties, physical constants and uses. 3 pp., Rohm and Haas Co.
- Plastics, Cold-Pour.**.....B700
4-page booklet gives information on the uses, ingredients, molds, preparation and advantages of the cold-pour plastic, "Palestic." Palestic Corp.
- Oils, Tall.**.....B701
Bulletin No. 7 is a bibliography with abstracts on tall oil in the paint, varnish, lacquer, core oil, ink, and related industries. 10 pp., National Southern Prods. Corp.
- Emulsifying Agents.**.....B702
12-page technical booklet with general technical data and pharmaceutical applications of the emulsifying agent, Promulsin. Watford Chemical Co., Ltd.
- Self-Emulsifying Agents.**.....B703
General technical data on Promulsin wax, with methods of use, formulation, pharmaceutical applications, formulas, cosmetic applications and prices. 8 pp., Watford Chemical Co., Ltd.
- Emulsifying Agent.**.....B704
General technical notes and data on Proviscol in 8-p. booklet by Watford Chemical Co., Ltd.
- Emulsifying Agents.**.....B705
21-page booklet consisting of complete range of Estax emulsifying agents with an indication as to their appearance, odor, characteristics, solubility, compatibility, properties and uses. Watford Chemical Co., Ltd.
- Chemicals.**.....B706
New and revised price list No. 4 for some dozen Grignard reagents, a half-dozen thiophene compounds, and several analytical reagents. Arapahoe Chemicals, Inc.
- Glutamate, Monosodium.**.....B707
Technical data sheet on the physical and chemical properties, as well as the utility of monosodium glutamate 99+ % pure. A. E. Staley Mfg. Co.
- Latex and Plastics.**.....B708
A complete technical bulletin on the resin Vihrin 108, consisting of its composition, use, properties, chemical resistance, storage and compatibility. 3 pp., Naugatuck Chemical.
- Fats, Oils and By-Products.**.....B709
12-page booklet on the high and low price records from 1938-1948 of fats, oils and by-products issued by The Davidson Commission Co.
- Chlorine Bleach.**.....B710
Bulletin No. 14, 68-page technical bulletin, takes up the general properties of hypochlorous acid and its salts, the types of industrially important bleach liquors, the preparation of bleach liquors, and also discusses chlorination equipment and the production of chlorine bleaches. Solvay Sales Div.
- Cleaning Acid.**.....B711
4-page technical data sheet on "Nielite" C cleaning and pickling acid with a description, purposes, uses, equipment required, operation and operational costs. Nielco Labs.
- Surface-Active Agents.**.....B712
Bulletin No. 3 is a brief on the uses and adaptability of various surface-active agents in the control of corrosion, including physical and chemical properties. 6 pp., Alcox Corp.
- Dimethyl Chloroacetal.**.....B713
Data. Bulletin No. 107R gives properties of purified dimethyl chloroacetal, representative reaction products from chloroacetals, with a chart of reactions and bibliography. 8 pp., Gen. Aniline & Film Corp.

- a-Furfuryl Mercaptan.**.....B714
1-page bulletin on the heterocyclic aromatic with physical and chemical properties, and suggested applications. Cargile Scientific, Inc.
- 2-Chloro-5-nitrobenzotrifluoride.**.....B715
Preliminary technical data sheet No. 369 listing synonyms, formula, typical physical data, description, suggested uses and availability of 2-chloro-5-nitrobenzotrifluoride. Hooker Electrochemical Co.
- Benzoic Acid.**.....B716
Technical Bulletin O-D-503, on benthal (technical benzoic containing phthalic) with its application in alkylid resins, is 8 pages and contains an introduction, properties, reactions and experimental data. Monsanto Chemical Co.
- Resurfacer, Roof.**.....B717
4-page folder gives advantages of the use of plastic and liquid roof resurfacer. Stonhard Co.
- Resins.**.....B718
7-page booklet gives a description of liquid polymers, pertinent information on preparation of modified resins and a large list of commercial resins which they will modify. Information on the properties of such modified resins is also given. Thiokol Corp.
- Chlordane.**.....B719
Control of livestock parasites with chlordane is contained in the technical supplement No. 203-C, with available formulations of chlordane, application and recommended dosage, dilution table and published references. 4 pp., Julius Hyman & Co.
- Chemicals.**.....B720
Price list of 12 pages on aromatic chemicals, balsams, gums, colors, concentrates, essential oils, fixatives, terpeneless and sesquiterpeneless oils and tinctures manufactured by Fritzsche Brothers, Inc.
- Sodium Sulfite.**.....B721
Technical Paper No. 114 on corrogen: catalyzed sodium sulfite, features detailed information on source of oxygen, mechanism of oxygen corrosion, indirect means of oxygen control, chemical degradation, factors affecting speed of reaction, uses of catalysts and application for corrogen. 8 pp., W. H. & L. D. Betz.
- Emulsifiers.**.....B722
The new high-concentrate type emulsifier for chlordane and toxaphene—Emcol H-74—is described in the recently released technical bulletin No. 27 from Emulsol Corp.
- Cleaner.**.....B723
Brochure with information of the new metal cleaner and conditioner, "Duridine," put out by Amer. Chemical Paint Co.
- Cleaner.**.....B724
Effective metal cleaning and conditioning with "Deoxidine" is discussed in brochure of Amer. Chemical Paint Co.
- Paints.**.....B725
Amer. Chemical Paint Co. offers brochure on "Lithoform," with information on preparing zinc surfaces for painting.

- Pastes.**.....B726
Bulletin released by Denfis Chemical Labs., Inc., describes carbitur, and isopac pack-hardening and isolating pastes and consists of 4 pages.
- Zinc Oxides.**.....B727
General information on zinc oxides for every purpose is contained in booklet of 25 pages put out by Amer. Zinc Sales Co., with details on leaded zinc oxides in the paint industry and shipping information.
- Wood Glues.**.....B728
The Casco Industrial Gluing Chart for wood glues compares general working properties, costs and recommended uses for various industrial wood glues. The Borden Co., Chem. Div., encloses with each chart a Glue Data Sheet, offering free consultation service on the best glue for a specific operation.
- Paint.**.....B729
Folder describes new mildew-, moisture-, and dirt-resistant white paint. Stonhard Co.
- Adhesives.**.....B730
Folder describes adhesives, cements, and special formulas, and contains a chart giving the correct adhesive to use in seventy-five combinations of materials. 4 pp., Sliomons Laboratories, Inc.
- Pickling.**.....B731
Brochure on pickling with "Rodine," with a description of the process, is issued by the Amer. Chemical Paint Co.
- Coating.**.....B732
Amer. Chemical Paint Co. gives details of cold-spray granodizing, a zinc phosphate coating process for steel.
- "Thermoil-Granodine."**.....B733
Brochure on the protection against rust and wear issued by American Chemical Paint Co.
- "Alodine."**.....B734
Cleaning and coating methods of "Alodine" discussed in a brochure of Amer. Chemical Paint Co.

Equipment

- Heaters.**.....J227
Explosion-proof heaters and typical installations are described in Form No. EC-54r, 2 pp., Electromode Corp.
- Conveyors.**.....J228
Bulletin RPB-48 gives features and applications of power belt conveyors, together with specifications. 4 pp., Rapids-Standard Co., Inc.
- Platform, Hydraulic.**.....J229
Bulletin describes flush-with-floor type hydraulic elevating platform, with a 30" square top, which elevates from floor level to 24". About 2000 lbs. may be elevated with ease. 1 p., Lyon-Raymond Corp.
- Feeders.**.....J230
Vibrator feeders with variable control of rate of flow are described in new 2-p. bulletin. Syntron Co.

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16-p. booklet contains specifications of acid and chemical centrifugal pumps, diagrams of the construction of various models, and a tabulation of materials for pumping various liquids. Lawrence Machine and Pump Corp.

DryingJ232
"Because Moisture Isn't Pink" gives a partial record of Lectrodryer equipment in solving drying problems, and illustrates installations in "big name" companies. No. 216, Pittsburgh Lectrodryer Corp.

BoostersJ233*
Bulletin shows various positions of Senior and Junior models of portable belt boosters, together with specifications. 4 pp., Island Equipment Corp.

Corrosion ControlJ234
"Corrosion Control for Underground Pipe" describes methods employed and the role of Fiberglass pipe wrap in corrosion control and test data on its properties and performance. 28 pp., Owens-Corning Fiberglass Corp.

Pumps, Rotary VacuumJ235
6-p. folder describes rotary, positive-single stage, pumps for dry or semi-wet vacuum applications. Type SS pumps are designed to maintain a constant vacuum within 5 mm of mercury of barometer in a closed system. Beach-Kusa Co.

PumpsJ236
Bulletin describes and illustrates self-priming, centrifugal pumps, capacities of 7,000 and 10,000 gallons per hour. Rice Pump and Machine Co.

Preheater, LacquerJ237
Bulletin describes a recirculating type of unit, the "Reliable Visculator", for spraying lacquers, synthetics, or heating of similar materials for other uses at elevated temperatures. 4 pp., Reliable Products Mfg. Co., Inc.

Water BathJ238
Folder describes outstanding feature, bottle feed, of new portable water bath. Barnstead Still and Sterilizer Co.

ManometerJ239
Publication TP-30-A describes manometers with ranges of 0" to 120" of water and 0" to 120" of mercury. 4 pp., Wallace and Tiernan Products, Inc.

SifterJ240
Bulletin 65 describes turbo sifters, and the unique sifting principle of the Abbe sifter, together with a list of many users. 7 pp., Abbe Engineering Co.

Thickness MeasurementJ241
New Bulletin 3700 describes theory and application of the Sperry Reflectogage, a portable, ultrasonic instrument, to non-destructive measurements of materials; tests for lack of bond, lamination and internal defects in sheet stock; and interpretation of visual ultrasonic indications. Sperry Products, Inc.

HeatingJ242*
Improved electric heating units and controls are described in new booklet, together with technical data, temperature conversion tables, application guide, and information on special-purpose heating units. 20 pp., Bulletin 103, Electro-Therm, Inc.

ResistorsJ243
Catalog describes line of resistors, controls and resistance devices. Listings concentrate on universal numbers wherever feasible for convenience. Clarostat Mfg. Co., Inc.

Meters, FlowJ244
8 pages of photographs show the various steps in making of Hays-Cochrane electrical and mechanical flow meters. Bulletin No. 800, Penn Industrial Instrument Corp.

CrushersJ245
Bulletin No. 5011 features advancements made in jaw crusher design in recent years, such as hinge pin location which permits "crushing without rubbing"; product control; pitman and toggle; lubrication; and built-in safety device. 12 pp., Pennsylvania Crusher Co.

CorrosionJ246
A 6-page report on corrosion tests in organic sulfations and sulfonations has been issued by International Nickel Co., Inc.

Counting, Timing, ControllingJ247
Brief guide to the company's line of high speed electronic counters, scalars, counter chronographs and special electronic frequency measuring equipment. 4 pp., Potter Instrument Co., Inc.

Drying, SprayJ248
Principles, advantages, and application of spray drying to many pumpable materials is discussed in new bulletin. Bulletin No. D-105, 16 pp., Swenson Evaporator Co.

Steel CastingsJ249
NEWSCAST, a new periodical edited for those who design, specify, use or purchase stainless steel valves, fittings and castings, includes technical data, and questions and answers. Cooper Alloy Foundry Co.

Fans, IndustrialJ250
6-page folder describes industrial and commercial fans and the proper applications for each. Catalog No. 864, Chelsea Fan & Blower Co., Inc.

FansJ251
4-page folder gives specifications and applications for fans. Catalog No. 863, Chelsea Fan & Blower Co., Inc.

FansJ252
Folder lists prices for Chelsea coolers. 4 pp., Chelsea Fan & Blower Co., Inc.

SteelsJ253
Analysis and applications for leading brands of company's stainless and heat-resisting steels, tool and die steels, and cast-to-shape steels are described in new booklet. 15 pp., Jessop Steel Co.

Stream Pollution ControlJ254
"For Effective Neutralization of Industrial Wastes—Micromax Automatic pH Control" describes a unique controllability analysis, explains how equipment regulates addition of reagent to raw waste so that pH is held within limits predicted. 20 pp., Bulletin ND44-96-708, Leeds & Northrup Co.

Alloy AnalysisJ255
Research paper covers introduction of the polarograph to U. S. and its application to analysis of high-purity zinc die casting alloys; sums up SIPP's experience with this method; includes a list of references. "Polarographic Analysis of Zinc Die Casting Alloys," Silverstein and Pinsof, Inc.

Fans, BlowersJ256
2-page data sheet gives dimension details for installation of various fans and blowers. Supplement A-Catalog 864, Chelsea Fan & Blower Co., Inc.

SteelJ257
Folder describes Permaclad (available in sheets and plates), a new product which combines the surface characteristics of stainless steel with the forming qualities of carbon steel. Alan Wood Steel Co.

Specific Gravity CupJ258
Bulletin describes new adjustable weight-per-aluminum cup featuring adjustable volume, light weight, all aluminum construction. 2 pp., Henry A. Gardner Laboratory, Inc.

ViscometerJ259
Bulletin describes principle, operation, cleaning, advantages, and price of vertical viscometer for readily measuring the viscosity of extremely viscous oils. 6 pp., Henry A. Gardner Laboratory, Inc.

Pipe BurnersJ260
General data, specifications, capacity selection tables, and dimension data are given on atmospheric type, natural gas, propane and butane and supplementing pipe burners. 8 pp., Data Sheet No. 1A-6, Bryant Heater Co.

Combustion Equipment, GasJ261
12-page bulletin gives capacity tables and describes gas-air mixers, blowers and boosters, burners, pilot and ignition devices, and controls, valves, and regulators. Condensed Catalog ID-292, Bryant Heater Co.

Support, Anode RodJ262
Page describes new unbreakable one-piece anode rod support designed to eliminate the use of bolts. 1 p., Automotive Rubber Co., Inc.

Control, Gas BurnerJ263
Diagram of system, installation, testing and adjusting, maintenance, and servicing of Fireeye Combustion Control System FF-5 are covered in 4-page bulletin. Installation Bulletin CG4752, Combustion Control Corp.

Ion ExchangersJ264
Bulletin describes laboratory, package and automatic demineralizers, together with schematic diagrams. 8 pp., Belco Industrial Equipment Div., Inc.

EngineJ265
Four cycle, one-cylinder, 4 1/2" x 5 1/4" Diesel engine is described and illustrated in Bulletin 165, together with specifications and information on lubrication, fuel system, governor, cooling system and starting. 6 pp., Nordberg Mfg. Co.

ViscometerJ266
"Accurate Viscosity Determinations with 'Slide-rule' Speed," describes twelve advantages of the Synchro-Lectric Viscometer, an instrument for quickly and directly measuring the viscosity or flow characteristics of materials and illustrates several models. 8 pp., Brookfield Engineering Laboratories, Inc.

Motor Control, MagneticJ267
Specifications for contactors, starters, relay heaters, and push button stations are given in 22-page folder, MS-41 to MS-58, Trumbull Electric Mfg. Co.

Wrench, ImpactJ268
4-page folder describes Size \$77 impact wrench designed to help get heavy equipment back into service faster. Ingersoll-Rand.

PyrometersJ269
Approved Navy and commercial type diesel engine pyrometers and thermocouples suitable for use on all types of diesel engines are described and illustrated with photographs and dimensioned drawings in new 12 page Bulletin P1239. Bristol Co.

TitrationJ270
Bulletin describes the Nylab titrator which consists of a newly designed titration stand and a sensitive dual purpose, line-operated, continuously indicating meter for both pH measurement and titration work. 4 pp., New York Laboratory Supply Co., Inc.

Hose, Lightweight FlexibleJ271
Catalog No. 30 gives applications, important features, installation data, general information and engineering data for Flexaust, ventilating hose. 12 pp., American Ventilating Hose Co.

Acid HoodJ272
Bulletin describes flexible vinyl plastic hood to protect wearer against acid splashes and sprays around acid lines, and lists other products of company. 2 pp., Mine Safety Appliances Co.

FilterJ273
Design, operation, construction, cleaning, specifications, applications and advantages of self-cleaning pressure leaf filter are covered in 5 pp. bulletin. Hercules Filter Corp.

Temperature ControlJ274
A manual for the modern laboratory and catalog which enables choice of necessary component parts of constant temperature control units to meet special design requirements. 64 pp., Emil Greiner Co.

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Bulletin describes automatic rotary sealing machines, listing "Auto-Feed" Speedsealer features. 2 pp., Pack-Rite Machines.

StrainersJ276
Bulletin No. 712 contains dimensions and weights, correct installation, maintenance, and cleaning, on forged steel strainers. 4 pp., Edward Valves, Inc.

Piping, Corrosion-ResistantJ277
"Corrosion-Resistant Piping Materials" contains descriptions and information on valves, fittings, fabricated piping and pipe coils, together with condensed recommendations, description of alloy materials, and corrosion questionnaire. 32 pp., Crane Co.

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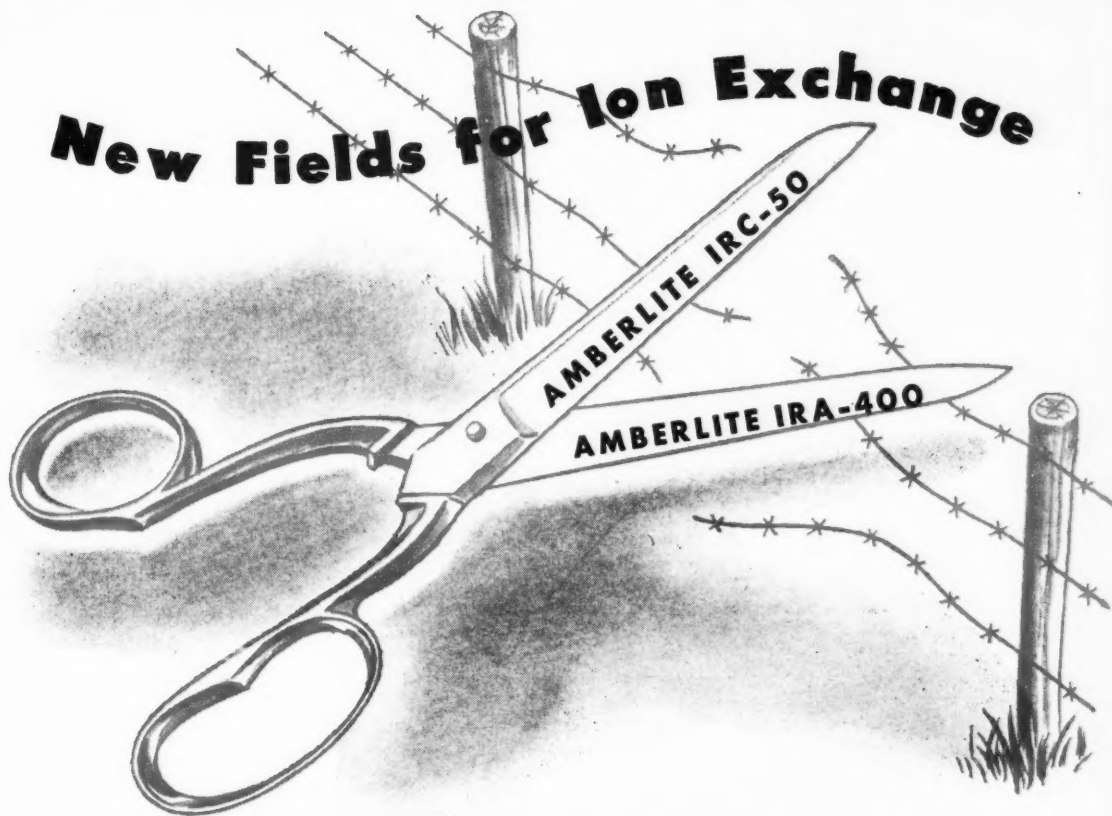
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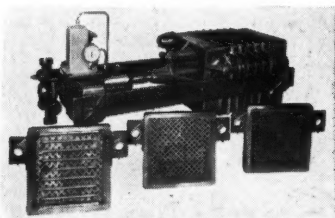
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The Resinous Products Division was formerly The Resinose Products & Chemical Company

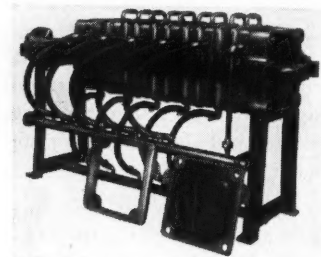
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PLANT OPERATIONS NOTEBOOK

Equipment Inspection

Proper inspection of equipment increases operating efficiency.

Generally speaking, if machines, equipment, and safety devices are properly maintained, manufacturing plants have more efficient operations, fewer work stoppages, and a reduction of accidents. This fact is particularly true of chemical plants, according to the National Safety Council.

Good maintenance means more than having equipment repaired when breakdowns occur. In addition to regular lubrication it involves periodic inspections to uncover minor defects. The procedure utilized for checking such equipment on a regular basis naturally depends largely on the size of the plant and the nature of the operations. One chemical manufacturing concern has used the following method quite effectively: An inspection coordinator was appointed to devote full time to the inspection program. His prime responsibility is to insure that necessary inspections are made as scheduled.

To simplify inspection, each piece of equipment in the plant is identified with a specific number, also useful for accounting purposes. A file is provided for each piece of equipment, which includes a complete history of the equipment, the name of the supplier, date purchased, working pressures, and any other pertinent information. Copies of all inspection reports are filed in this folder so that a complete history is available at all times.

Forms listing all desired information are provided for the various types of equipment. These are primarily designed to serve as guides to the maintenance men doing the actual inspection so that no important inspection point is overlooked. They also serve to record the findings of inspections.

The operating department head is responsible for issuing orders to have equipment and safety devices under his jurisdiction inspected as scheduled, and repaired. The inspection coordinator, who is charged with the responsibility for follow-up to make certain that such inspections are made, fastens a color tab on each folder, indicating the month when equipment is scheduled for re-inspection. If the red tab indicates that equipment is due for inspection during March, a quick glance at his file indicates the inspections he has to follow up before April. The follow-up is accomplished by sending a form memo to the operating department heads requesting orders for an inspection, if it is overdue.

The actual inspection is made by trained mechanics and checked by their foremen. Safety valves and flash arresters are checked periodically for an entire area at one time, thus saving some labor, while centrifuges and pressure equipment are checked individually. Elevators and hoists are inspected as required by state law.

The equipment and safety devices are checked at least every six months. As a practical measure, however, the condition of equipment at the time of the last inspection determines the time of the next inspection. Some safety valves which come in contact with highly corrosive materials are checked weekly. About 25 per cent of the equipment is checked at least once a month, but all scheduled for routine inspection is examined at least every six months.

Pressure equipment is examined by the insurance carrier's engineers. It is common for hydrostatic tests of 1½ times working pressures to be applied to such equipment as the insurance company's representative believes necessary after visual inspection.

The maintenance men's findings are checked by his immediate supervisor, who in turn sends the report to the inspection coordinator. He checks the report against the previous inspection, and sets the date for the next routine inspection. Copies of the original report are made for the file, and the original is routed through the safety department and then to the operating department head.

Superheat Loss

A large superheat loss may occur if the diameter of the steam line is too large.

Regardless of the thickness of insulation used, a surprisingly large loss of steam superheat may occur if the diameter of the steam line is too large for the desired steam flow conditions, according to the Magnesite Insulation Manufacturers Assoc.

Such a case occurred recently in a plant where an outdoor line, 6 in. in diameter and 925 ft. long, with an ambient air temperature of 80° F., was used to transmit superheated steam at 250 psi and 600° F. The line was insulated with 2½ in. thick 85% magnesite pipe insulation. However, the steam temperature at the end of the line was only 450° F.

An analysis indicated that the steam velocity in the line was only a little over 1,300 ft. per min., whereas it should have been between 6,000 and 10,000 ft. per minute. The result was that, due to the relatively large size of the pipe and

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$$ML/T = 21 \quad (1)$$

Even with nonpolar liquids, it has been shown that the ratio increases as the normal boiling point increases. To compensate for this change, Kistyakowsky proposed the following equation⁴:

$$ML/T = 8.75 + 4.571 \log T \quad (2)$$

A nonpolar compound is one that has its atoms symmetrically arranged in the molecule, so that no unbalanced electrical charges tend to rotate the molecule when in an electrostatic field. In general, compounds having symmetrical molecular arrangements such as methane or carbon tetrachloride may be expected to have nonpolar characteristics. Equations 1 and 2 do not apply to highly polar compounds such as water, ammonia, ethyl alcohol and acetic acid.³

A nomograph was constructed from Equation 2 by rearranging it to read

$$ML = 8.75T + 4.571T \log T = f(t) \quad (3)$$

This equation is readily plotted as a nonlogarithmic multiplication chart,¹ substituting values of $f(t)$ for $8.75T + 4.571T \log T$.

For example, carbon tetrachloride,

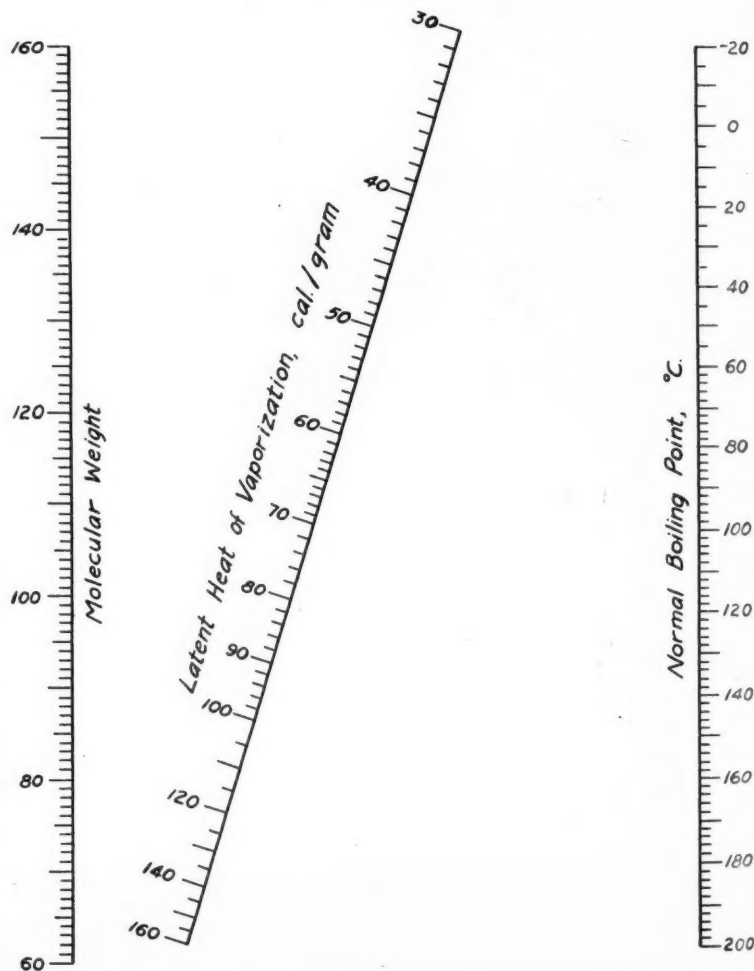
CCl_4 , has a normal boiling point of $76.7^\circ C$, and its molecular weight is 153.8. A straight line drawn through these values on the nomograph intersects the latent heat line at 45.5 cal. per gram. The corresponding value from the literature is 46.5 cal. per gram.

Nomenclature

- L = Latent heat of vaporization in calories per gram
- M = Molecular weight
- T = Boiling point at 1 atm. (normal boiling point) in degrees Kelvin
- t = Boiling point at 1 atm. (normal boiling point) in degrees Centigrade

Literature Cited

1. Davis, D. S., "Empirical Equations and Nomography," p. 122, New York, McGraw-Hill Book Co., 1943.
2. Hougen, O. A., and Watson, K. M., "Industrial Chemical Calculations," p. 136, New York, John Wiley and Sons, Inc., 1936.
3. Ibid., p. 77.
4. Kistyakowsky, A. V., Zeit. physik. Chem., 107, 65-73 (1923).



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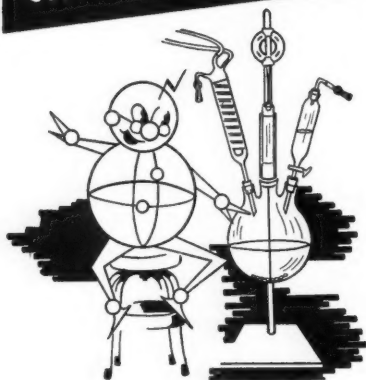
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LABORATORY NOTEBOOK

Safe Handling of Small Gas Cylinders

When a small cylinder of compressed gas is being used with a needle valve and simple yoke, there is no way to limit the pressure of the gas being withdrawn as is usually done with a reducing valve on the larger cylinders. Obviously, this is an unsafe practice, since it is possible to shatter glass equipment connected to the cylinder.

To provide relief for the pressure when reducing valves cannot be used, a "tee" tube should be inserted in the line between the cylinder and the equipment, according to the National Safety Council. A combination yoke and needle valve should always be used. One arm of the "tee" tube should extend into an inert liquid to provide a liquid seal.

Mercury is a suitable liquid for most laboratory gases, i.e., carbon dioxide, chlorine, hydrogen, nitrogen, oxygen and sulfur dioxide. *Mercury is not suitable for use with ammonia, as an explosive compound may be formed.* Liquid petrolatum should be used for ammonia and hydrogen sulfide.

Infrared Spectrometry

A new technique of infrared absorption spectrometry which permits the use of water as a solvent was described by Dr. R. Bowling Barnes, research director of American Optical Co., before the Louisiana State University Symposium.

The technique involves the use of heavy hydrogen, which shifts the water vapor band away from the portion of spectrum under investigation, eliminating interference from this source.

The infrared spectrum of a given organic compound may be used to characterize the particular compound in question. In contradistinction to many other physical properties, the infrared spectrum of a mixture of two compounds, A and B, does not lie somewhere between A and B, but consists of a direct superposition of the spectrum of A plus the spectrum of B. This is true for a mixture of any number of components, provided the components exist individually and do not exhibit any physical or chemical interactions among themselves. Thus, the infrared spectrum of a mixture may be used for purposes both of qualitative and quantitative analyses.

Dr. Barnes said that such a spectrum, as generally presented, is a plot of per cent transmittance as ordinates versus the wave length (in microns) or the frequency (in cm.—1 = 1.104), as abscissas. The latter furnish the data for

qualitative analyses, whereas the former supply the information needed for making a quantitative analysis.

Rare Chemicals

The National Registry of Rare Chemicals, 35 W. 33rd St., Chicago 18, Ill. is searching for the following materials

1-Nitro-2-naphthol
2-Nitroso-1-naphthylamine
2-Nitro-1-naphthol
8-Nitro-1-naphthoic acid
1-Nitro-2-naphthoic acid
o-Nitrosobenzoic acid
2-Hydroxy-1-anthramine
3,3'-Diiodo-4,4'-diaminodiphenylmethane
1,3,5-Hexatriene
5-Pentacycliresorcinol
Cumic acid
Pyrographic oxide
3-Methyladipic acid
Sodium chlorosmate
2-Amino-1-naphthol
Thujyl alcohol
1,2-Hexadiene
Hexabromobenzene
Di-n-decyl amine
Cyclopropanone
Methylphenanthridines
Nitrophenanthridines

Hydrocarbons and Sulfur Compounds

The most recent additions to the NBS standard samples of hydrocarbons and sulfur compounds are as follows: (Each 5-ml. sample costs \$35.00)

NBS sample number ^a	Compound	Amount of impurity ^b mole percent
Hydrocarbons		
568-SS	n-Hexadecane	0.06±0.04
528-SS	cis-3-Hexene	0.13±0.08
569-SS	1, 2-Pentadiene	(0.34±0.15) ^c
570-SS	2,3-Dimethyl-1,3-butadiene	(0.06±0.03) ^c
571-SS	1-Methyl-4-isopropylbenzene	0.05±0.03
572-SS	1-Methyl-E-tert-butylbenzene	0.08±0.05
Sulfur Compounds^d		
901-SS	Thiophene	0.01±0.01
902-SS	2-Thiabutane (Methyl ethyl sulfide)	0.04±0.04
903-SS	3-Thiapentane (Diethyl sulfide)	0.06±0.04

^a The designation "—SS" following the sample number indicates a sample of 5 ml sealed "in vacuum" in a special Pyrex glass ampoule with internal "break-off" tip.

^b The purity has been evaluated from measurements of freezing points, as described in Research Natl. Bur. Standards 35, 355 (1945) RP1676 unless otherwise indicated.

^c When sealed. Polymer formed may be removed as residue by simple vaporization of the sample "in vacuum" at an appropriate temperature.

^d See Chem. Eng. News 24, 2765 (1-46) regarding the nomenclature of these compounds.

Tollens Reagent

The National Safety Council reminds all laboratory personnel that Tollens Reagent (silver nitrate-ammonia for aldehydes) should not be allowed to stand. It should be freshly prepared each time it is used, since a highly explosive precipitate may be formed upon standing.

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This is exactly what has happened in our latest publication "ACETYLENE CHEMISTRY" by Julius Walter Reppe—Office of Technical Services (O.T.S.) Report PB 18852-s.

When we first received the microfilmed copy of this report from O.T.S., Department of Commerce in Washington, certain important parts had been omitted or overlooked by the original translator. We then asked the Office of Technical Services for the original report as written by Mr. Reppe and found approximately 50,000 additional words had never been translated or published. This additional material is now incorporated in the text as published by ourselves and has lengthened the report considerably. Our first estimate was that this book would comprise about 125 pages whereas it now amounts to a 200 mark. Also we are including a complete table of contents plus a subject index.

It may be that the "joke is on us" but we are going to adhere to our originally quoted price — \$10.00 per copy — A BAKER'S DOZEN???? We leave it to you to answer that question after you once have seen and thoroughly checked it.

If you do not have a copy may we suggest that you order it as soon as possible.

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INDUSTRY'S BOOKSHELF

Metals and Alloys.

ENGINEERING METALS AND THEIR ALLOYS, by Carl H. Samans. MacMillan Co., New York, 1949; 913 pp., \$7.50. Reviewed by Mars G. Fontana, Ohio State University.

DR. SAMANS has attempted to cover, in this one book, the entire field of ferrous and non-ferrous metallurgy and metallurgical engineering. Some of the topics included are production metallurgy, extractive metallurgy, mechanical metallurgy, metallography, physical metallurgy, principles of heat treatment, corrosion and its prevention, tool steels, testing, shaping and forming, welding, furnaces, theory of alloys, powder metallurgy, machinability and high temperature materials. As a result the information is spread quite thinly.

The classification of engineering metals from an application standpoint rather than from an alloy viewpoint is interesting. The book contains many excellent photomicrographs and illustrations.

As a source of general information this is a good reference book. It is not particularly recommended for metallurgists unless a quick "refresher" is desired. The book is recommended for engineers (non-metallurgical) and others who desire general information and a "speaking acquaintance" with engineering metals and alloys. The book may be suitable as a text for beginning courses in the subject in that particular sections of the book could be selected for a given course.

Patent Law

PATENT LAW, by Chester H. Biesterfeld. John Wiley & Sons, Inc., New York. Second ed., viii + 267 pp., \$4.00. Reviewed by Harry Goldsmith, Patent Attorney, Upper Montclair, N. J.

THOSE who have found Mr. Biesterfeld's first edition (1943) valuable will want to be brought up-to-date with the second.

The head of the Du Pont Patent Department has done a commendable job of succinctly presenting, in a volume of modest size, the basic principles of the substantive patent law so that the general reader, who has little time, can skip the supporting legal decisions, while one who wishes can delve deeper.

There are over forty more pages in the new edition. The number of chapters is the same and chapter headings are substantially identical. The text, however, is extensively revised.

Those whose specialty is chemistry will be particularly interested in Chapter

VIII, "Permissible Breadth of Chemical Claims." Here in several added pages is favorably discussed a recent court decision which held, contrary to the prevailing line of decisions, that a claim covering a group of chemical compounds was not void because an inoperative chemical happened to fall within the claim terminology. However, since publication of the book, the U. S. Supreme Court has struck down this holding of the lower court. The patent profession will still have to resort to "Markush claims" which are the topic of a new section.

The article on "Chemical Claims" remains substantially the same, but Chapter IX, "Patentability of Uses," becomes in the new edition "Unpatentability of Uses and Products of Nature." Completely rewritten, the chapter includes an article on "Products of Nature."

The text is elsewhere liberally interspersed with references to chemical patent matters, more so than will be normally found in the usual general book on patent law.

The reader should remember that the Rule numbers in the text are now obsolete and do not correspond with those of the New Rules of Patent Office Procedure which went into effect on March 1, 1949.

Textile Bleaching

AN INTRODUCTION TO TEXTILE BLEACHING, by J. T. Marsh. John Wiley and Sons, Inc., New York, 1948, 512 pp., \$6.50. Reviewed by L. C. Leatherland, Head, Chemical Engineering Division, Institute of Textile Technology.

THIS IS an American reprint of Mr. Marsh's original 1946 English publication, which was soon out-of-print because of the paper shortage. It is one of four very good books of Mr. Marsh's on scientific aspects of the textile industry, published 1941-48.

The first 100 pages are devoted to discussions of the physical and chemical properties of the cellulose fibers, silk, wool, and many synthetic fibers. In the next 50 pages are discussed the properties of water, alkalis, soaps, and detergents. These two sections of the book present a necessary background to a proper understanding of the processes and operations described in the remainder of the book. Half of the book describes and discusses the finishing processes preceding bleaching and several bleaching processes for the fibers mentioned above. Thirty-five pages cover the subject of the drying of textiles. The last section

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describes tests for damages which might be encountered in the finishing processes described.

This is obviously an introduction to the subject of textile bleaching. However, it is also obviously an extensive coverage of this subject. It is written in a clear, logical, and objective manner. Its objectivity makes it outstanding in the literature of the textile industry. The description of each process includes, in good balance, operating information, practical applications, and theoretical considerations. One exceptionally valuable part of the book is the large number of literature references included in the text. A limited bibliography is included in the appendix. Many illustrations add to the clarity of the discussions.

Because this is a British text, its terms and names of processes, operations, and equipment differ in some cases from American practice. Also, references to gallons are to British Imperial gallons.

This volume is recommended as an excellent text or reference work for scientists or technologists interested in the textile industry.

Polymer Theory

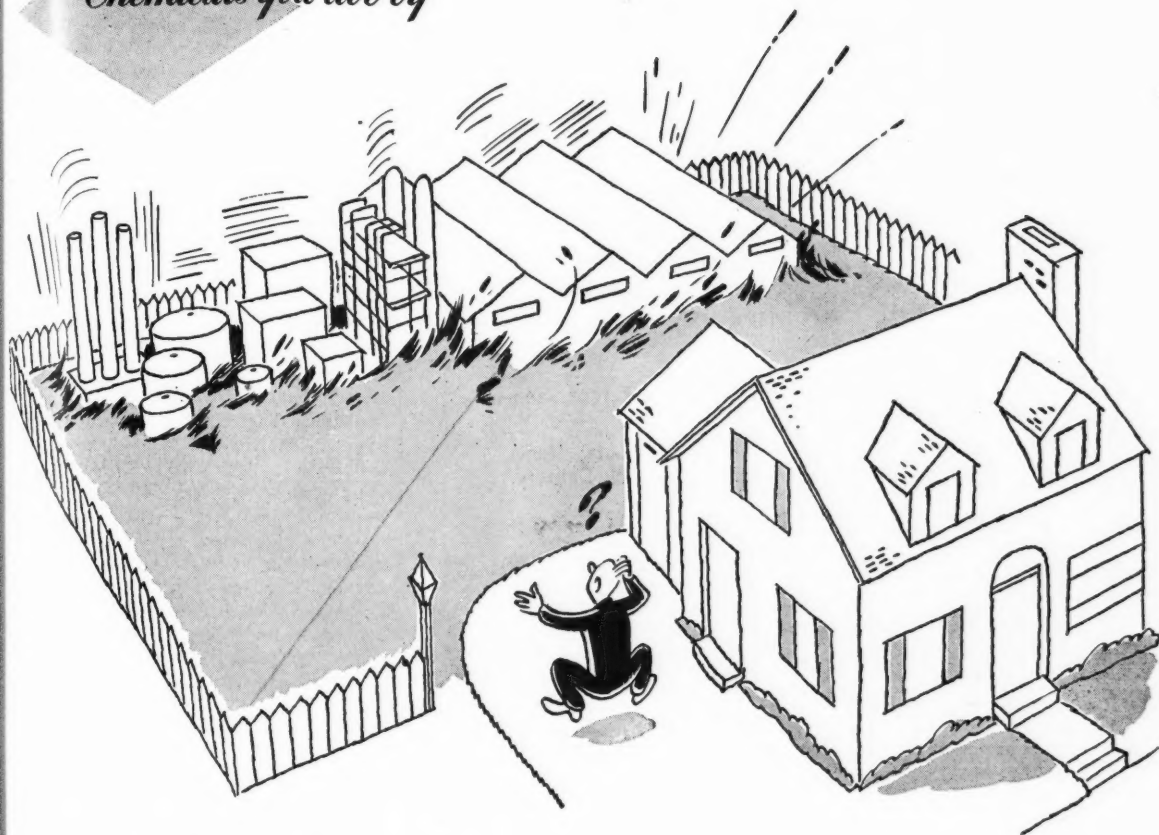
THE THEORY OF SOLUTIONS OF HIGH POLYMERS, by A. R. Miller. Clarendon Press, Oxford, England, 1948; vii + 118 pp., 12s, 6d. Reviewed by Maurice L. Huggins, Research Chemist, Eastman Kodak Co.

SOLUTIONS of linear high polymers show extreme departures from the ideal solution laws, even in the absence of interaction energy effects known to be responsible for such departures in solutions of small molecules. Much of the peculiar behavior of high-polymer solutions and gels can be attributed to this fact.

Several research workers, including the author and the reviewer, have shown that this behavior can be attributed to entropy (randomness) effects, related to the elongated shapes of the solute molecules. By a variety of methods, differing in mathematical detail but not in principle, approximate calculations have been made of the magnitudes of these effects, as dependent on molecular chain length and other variables. Comparison with vapor pressure, osmotic pressure, turbidity and other types of experimental data on actual high-polymer solutions shows fair agreement—sufficient to indicate that the theories are in the main correct, yet poor enough to show that they need further refinement, especially in the higher concentration ranges.

In this book, Dr. Miller presents in detail the calculation, using the elegant methods of statistical thermodynamics developed by Fowler and Guggenheim, of the entropy and free energy of mixing, for solutions of chain molecules. He then

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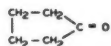


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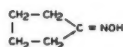
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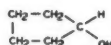
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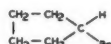
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briefly compares the theoretical results with experimental data on rubber and polystyrene solutions and discusses possible extensions of the theory which might improve the agreement.

A person unacquainted with the mathematical methods and language of statistical thermodynamics would be able to extract little of value from this work. On the other hand, it can be highly recommended to those interested in critically studying the statistical theory of solutions and in extending that theory further.

Nuclear Series

John Wiley & Sons will bring out the fifth volume in its continuing program of books in the nuclear sciences in the next few months, according to an announcement of the publisher. "Radioactive Measurements with Nuclear Emulsions," by Herman Yagoda, was the fourth, published in March, and "Introduction to Radiochemistry," by Gerhart Friedlander and Joseph W. Kennedy, is scheduled to appear in June.

Wiley's nuclear science program was announced late in 1947 with the publication of "Elementary Nuclear Theory," by Hans A. Bethe. The second and third books in the group—"The Structure of Matter," by Francis Owen Rice and Edward Teller, and "Isotopic Carbon," by Melvin Calvin and four associates—were published in January 1949.

Other Publications

INDUSTRIAL RESOURCES OF TENNESSEE is available in a new edition in five volumes, three of which are now ready. Volume 2 (Forests, Agriculture, and Minerals) and Volume 3 (Water Supplies, Fuels, Electric Power, and Transportation Facilities) are \$1.00 each; Volume 5 (Industrial Regulation, Taxes, and Licenses) is \$0.50. Industrial Development Division, Tennessee State Planning Commission, 432 Sixth Ave., N., Nashville 3, Tenn.

ETHYL ETHER and SODIUM CYANIDE are the subjects of two new chemical safety data sheets. They are available at \$0.20 each from the Manufacturing Chemists' Association, Inc., 246 Woodward Bldg., Washington 5, D. C. Send remittance with order.

CANADIAN MINERAL INDUSTRY, 1946, Report No. 824, is available for \$0.25.

SUMMARY INVESTIGATIONS ON NEW BRUNSWICK OIL SHALES, 1942, Report No. 825 is available for \$0.15. Remittance should be made by postal money order payable to the Receiver General of Canada, and sent to the Chief, Bureau of Mines, Booth St., Ottawa, Canada.

ATOMIC ENERGY NEWSLETTER is a new bi-weekly publication reporting new products, new materials and new equipment in the atomic field, \$18.00 per year, Atomic Energy Newsletter, 509 Fifth Ave., New York 17, N. Y.

MICROBIOLOGICAL DEGRADATION OF ORGANIC MATERIALS: ITS PREVENTION AND METHODS OF TEST, is obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at \$0.25 (\$0.35 abroad).

Films

PAINTING WITH NYLON is a fifteen-minute full color and sound motion picture presenting the story of nylon paint brush bristles. It is available for showing without charge to any interested group in the painting industry. Plastics Dept., E. I. DuPont de Nemours & Co., Wilmington, Del.

HUMAN FACTORS IN SAFETY is a series of six 35mm sound slide films designed to train foremen in safety practice. For further information write the National Safety Council, 20 North Wacker Drive, Chicago 6, Ill.

Dorothy Lamour says . . .

"I like The Shamrock because . . .



You'd think that after playing so many screen parts in a sarong I'd be at home only 'neath a coconut palm. Well, nothing could be further from the way I feel. I revel in the luxurious comfort of a hotel like The Shamrock. I like the restful appeal of its interior designing . . . the thrilling atmosphere of the dining and ballrooms. I enjoy the excitement of a night . . . or a long series of nights . . . among people who come to The Shamrock from all over the nation; yes, celebrities and just plain folks . . . I like to be with them all. I like The Shamrock because it does so much for you to make life there a wonderful adventure."

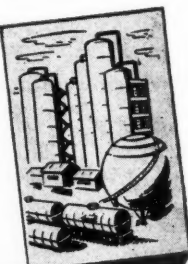
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NEWS OF THE MONTH

Lion Oil Co., El Dorado, Ark., is increasing facilities at its chemical plant for the production of anhydrous ammonia by 130 tons per day to bring the total ammonia production to 570 tons per day. This plant enlargement should be in operation on or before July 1, 1949. Substantial additions and modernizations to ammonium nitrate prilling facilities will also be in operation at about the same time. A plant for the production of sulphuric acid as an intermediate product will be completed in the third quarter of 1949. A 380-ton-per-day ammonium sulphate plant will also go into production late in the third quarter.

Pure Carbonic, Inc., an Air Reduction subsidiary and one of the largest suppliers of carbon dioxide in the country, has opened a new carbon dioxide and dry ice manufacturing plant in Chicago, Ill.

The new plant has a daily capacity of more than 140 tons, making it one of the largest units of its type in the United States. The two-story brick and steel building occupies 38,500 sq. feet of floor space and was built at a cost of approximately \$3 million.

The **Merichem Co.** has completed its new plant for the manufacture of cresylic acid on the company's 18-acre site near the Houston Ship Channel, Tex. Construction was started fifteen months ago and the unit went on stream April 15th. Total cost of the plant is approximately one-half million dollars.

Three boiling ranges of cresylic acid are being produced: 183°-205° C., 205°-230° C., and 230°-245° C. The material is highly refined and of a high purity. Petroleum raw materials are being used. The cresylic acid is available in tank cars and drums. Other products will be announced later as the company expands its operations.

The **Westvaco Chemical Division** of Food Machinery & Chemical Corp. has arranged for a further expansion of facilities to produce elemental phosphorus and a variety of phosphates. A second electric phosphorus furnace will be installed at its Pocatello, Idaho, plant. Provisions for such an installation were made in the design of that plant, and power and material contracts covering the requirements of the second unit had also been arranged. Facilities for converting phosphorus from the second unit to soluble phosphates are being provided through an expansion of the Division's Carteret, N. J., phosphate plant and



Earl W. Bennett (l.), elected chairman of the board of directors, **Dow Chemical Co.**, **Mark E. Putnam**, named general manager, and **Donald Williams**, appointed director of sales. Mr. Bennett has been treasurer of the company since 1930 and Dr. Putnam a vice-president since 1942.

through the erection of a new phosphate plant on the Pacific Coast. An engineering-construction contract covering all these jobs has been let to **United Engineers & Constructors, Inc.**, of Philadelphia. All critical and long delivery equipment has been on order for some time. Construction schedules call for completion of the new furnace on January 1, 1950, with the associated phosphate facilities being ready in time to receive and process the new phosphorus supply.

A. E. Staley Manufacturing Co.'s pioneer soybean oil expeller plant at Decatur, Ill., will be replaced with a new and modern solvent extraction plant at a cost of several million dollars. The new extraction plant will be erected on a site adjacent to the company's present extraction plant, which was completed in 1945.

The new plant will not increase the total soybean processing capacity, merely replacing an old process with a newer and more efficient one. Higher oil price levels and acute competition have made the large expeller plant uneconomic and the company was faced with the problem of either increasing present extraction capacity or decreasing the volume of soybeans processed.

Changes and additions which will increase the capacity of present power plant and distribution systems by 21 per cent and allow for an ultimate 70 per cent increase are also under way. These changes are a part of the firm's \$11 million plant modernization and expansion program.

Reynolds Metals Co., Louisville, Ky., has purchased a government-owned aluminum extrusion plant at Grand Rapids, Mich., for \$1.5 million. The plant, built during World War II at a cost of \$6,774,-

000 is designed for the production of high strength aluminum rod, bar, shapes and tubing and has a rated annual capacity of 10,800,000 pounds of aluminum. Its wartime operator was **Extruded Metals, Inc.**

A new process for producing low cost oxygen from air has been successfully tested commercially for the first time by **Hydrocarbon Research, Inc.**, perfectors of the process. Startup runs have been completed at the first plant to use the method—**McCarthy Chemical Co.** at Winnie, Texas. The plant has been producing in excess of 200 gross tons per day of 90 per cent oxygen for the synthesis of methanol, formaldehyde, and other petrochemicals.

In large quantities, the process can make oxygen available for such industrial uses as steelmaking, synthetic fuel production, and many chemical processes for a cost as low as \$3.50 a ton. However, costs at the McCarthy operation may run somewhat higher than this figure.

While this is presently the world's largest, single commercial installation, it will be dwarfed by a second plant utilizing the **Hydrocarbon Research Process** which will be operating later this year with a capacity of 2000 tons per day of oxygen. It is being built for the **Carthage Hydrocol Corp.**, Brownsville, Texas.

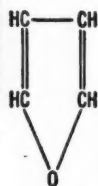
A new antibiotics laboratory has been completed in Detroit, Mich., for **Parke, Davis & Co.**, by **The H. K. Ferguson Co.**, industrial engineers and builders.

Containing the most modern facilities, the plant will provide laboratory, development, production and administration facilities. Of structural steel construction with brick and stone trim exterior, the

NEW CHEMICALS FROM DU PONT

FURAN

An important intermediate
in organic synthesis



With its conjugated unsaturation, furan has reaction characteristics somewhat similar to divinyl ether and butadiene, but modified by its cyclic structure. Substitutions, additions, and fission of the ring can be effected depending on conditions employed. The following reactions serve to illustrate the versatility of furan:

Oxidation	→ Maleic Acid
Reduction	→ Tetrahydrofuran
Chlorination	→ Chlorofurans
Nitration	→ Nitrofurans
Sulfonation	→ 2-Furan Sulfonic Acid
Conversion to other Heterocyclic Compounds	→ Pyrrole and Thiophene
Acylation	→ Alkyl and Aryl 2-Furyl Ketones
Acetalization	→ 2,5-Dialkoxy-2,5-Dihydrofurans
Diels-Alder Diene Synthesis	→ Dehydropyrocane and Thianthrene
Metalation	→ 2-Furyl Sodium

PHYSICAL PROPERTIES

Appearance.....Colorless liquid
Odor.....Mild, pleasant
Molecular Weight.....68.07
Boiling Point...31.3°C. at 760 mm.
Specific Gravity, 20/4.....0.937
Index of Refraction, N_D20/D.....1.4214
Flash Point.....Below -40°F.
Solubility.....Insoluble in water.
Miscible with most common organic solvents.

AVAILABILITY

Furan is available in ample quantities for research and development purposes. A request on your company letterhead will bring further technical information and also a sample if desired. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Field Research Section, Wilmington 98, Del.



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ELECTROCHEMICALS

FIELD RESEARCH SECTION

building is 275 feet long and 75 feet wide, and has a full basement in addition to its four floors. Laboratory and processing areas are completely air conditioned, and the remainder of the structure is ventilated with air drawn through electrostatic filters.

The Du Pont Co. will build a new unit at its Washington Works, near Parkersburg, W. Va., for the first full-scale manufacture of its plastic, "Teflon" tetrafluoroethylene resin.

Construction will be started in the late spring or early summer of this year and the work will be finished in about twelve months.

The Tungsten and Chemical Division of Sylvania Electric Products, Inc., has begun construction of a plant addition which will increase manufacturing and warehouse space by approximately one third. This is the second expansion of plant within the past year to meet increased demand for tungsten and chemical products for the television industry.

Givaudan Flavors, Inc., a new corporation devoted exclusively to the production and sales of flavors, has been formed by Givaudan-Delawanna, Inc., manufacturers of aromatic materials. The new affiliate will take over the activity of the flavor division of the company. Executive and sales offices will be maintained at 330 West 42nd Street, New York, N. Y.

Western Chemicals, Inc., and Mount Chemical Co., Inc., have been combined and will operate as Western Chemicals, Inc., with headquarters at the Western warehouse, Portland 1, Ore. Western Chemicals has been engaged in the jobbing of heavy chemicals and equipment for the textile and chemical industries while the Mount organization has been acting as agents and brokers of oils, raw materials and equipment for the paint, paper and food industries. The combining of the two companies gives the organization complete lines for all industries throughout the Northwest.

DeMert & Dougherty, Inc., of Chicago, Milwaukee, and St. Louis, has formed a new Industrial Sales Division, and has purchased an additional plant at 4814 South Richmond Street, Chicago, to handle its activities. J. C. Browning has been appointed to head the division, which will offer a complete line of petroleum and coal tar solvents, naval stores, alcohols, esters and plasticizers.

Cochrane Corp., Philadelphia, manufacturer of water conditioning equipment and steam specialties, has acquired for cash substantially all of the capital stock of Liquid Conditioning Corp., Linden, N. J., which manufactures a complete line of equipment for the conditioning of water

and other liquids, under the trade name, "Liquon." Hereafter, Liquid Conditioning Corp. will operate as a wholly owned subsidiary of Cochrane Corp., the products of the former continuing to be marketed under its trade name. The engineering, sales and technical staffs of the two corporations will augment each other.



Carl F. Prutton, appointed vice-president-director of operations of Mathieson Chemical Corp. He joined Mathieson last year as director of research.

Chemical companies report the following earnings on past operations:

Company	Net Income After Taxes	
	First Quarter of 1949	1948
Air Reduction Co., Inc.	\$1,817,430	\$1,378,170
Atlas Powder Co.	338,763	338,763
Hercules Powder Co.	2,501,690	2,975,181
Lion Oil Co.	2,222,779	2,988,848
Mathieson Chemical Corp.	1,291,552	805,971
McKesson & Robbins, Inc.	2,009,303	2,007,861
Monsanto Chemical Co.	4,461,608	3,805,588
Penick & Ford, Ltd.	443,908	204,419
Union Carbide & Carbon Corp.	24,529,419	23,019,721
The Davison Chemical Corp.	Nine Months Ending March	
	1949	1948
The Davison Chemical Corp.	\$1,462,000	\$1,914,000
The Year	1948	
	1948	1947
Air Reduction Co., Inc.	\$6,457,947	\$5,701,648
American-Marietta Co. and Subsidiaries	1,212,677	1,831,148
The Carborundum Co.	1,046,922	1,878,629
General Aniline & Film Corp.	8,604,919	3,333,250
Standard Oil Co. of Cal.	161,491,932	107,268,575

Blackman and Uhler Co., Spartanburg, S. C., has been appointed to represent Hilton-Davis Chemical Co., Cincinnati, in the southern textile field. With the appointment, Hilton-Davis made public a new series of trade names for its expanding catalog of textile dyestuffs, naphthols, salts and fast bases. "Hidacid" is the trade name selected for the Hilton-Davis group of acid dyes; "Hidaco" for basic dyes; "Hiltonaphthols" for naphthols; "Hiltosal" for salts of fast bases; and "Hiltonil" for the fast bases.

The U. S. Atomic Energy Commission has selected an area in Idaho, in-

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...that may be
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DI-ISOPROPYL
DIXANTHOGEN



MIXED ETHYL—AND DIMETHYL—
MERCAPTOTHIAZOLES

★ As a modifier in polymerization reactions, or as a flotation agent, Di-isopropyl Dixanthogen may prove profitable and readily useful to you.

You may find Mixed Ethyl- and Dimethylmercaptothiazoles useful as a flotation agent, fungicide, oil additive, or as a chemical intermediate—particularly if you are in the pharmaceuticals, plastics, or photo-

graphic materials industries. Also the metallic salts of this compound are useful as oil additives.

Complete information will be furnished promptly. Prices on request. Both chemicals are available in commercial quantities. Please write Dept. CC-5, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio.

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cluding the Naval Proving Grounds at Arco, as the best site for a new national reactor testing station. Negotiations are under way with the Navy for the transfer of the Proving Grounds to the Commission.

The total area of the new AEC facility will be about 400,000 acres. All but approximately 20,000 acres of the desired area near Arco is government-owned land. The new reactor testing station will compare in area with the Hanford plutonium production center on the Columbia River in Washington.

Tracerlab, Inc., a pioneer in the radioactivity field, has filed a registration statement with the Securities and Exchange Commission covering the issue

and sale of 104,000 shares of common stock (\$1 par value) by the Boston concern. All of the shares are to be offered publicly. The company has named Lee Higginson Corp. as the underwriter.

Of the net proceeds of the financing, the company plans to use \$600,000 for development of industrial applications for radioactivity and the manufacture of equipment for that purpose; \$250,000 for expansion of present commercial products; \$120,000 to purchase a new building for laboratory and plant improvements and the balance for other corporate uses.

The Tamms Silica Co., Chicago, has opened an office and warehouse in Detroit, Mich. Tamms will stock numerous

raw materials for paint and push manufacturers in the new warehouse to facilitate distribution. In addition to raw materials, the company manufactures a complete line of water-mix paints, colors, household sundries and inerts for paint grinders.

CALENDAR of EVENTS

AMERICAN CHEMICAL SOCIETY, 116th national meeting, Atlantic City, N. J., Sept. 19-23.
AMERICAN ELECTROPLATERS' SOCIETY, 36th annual convention, Schroeder Hotel, Milwaukee, Wis., June 27-29.
AMERICAN GAS ASSOCIATION, production and chemical conference, Hotel New Yorker, New York City, May 23-25.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Hotel Statler, Boston, Mass., June 8-10.
AMERICAN MANAGEMENT ASSOCIATION, general management conference, Hotel Pennsylvania, New York City, June 8-9.
AMERICAN PHARMACEUTICAL MANUFACTURERS ASSOCIATION, Homestead Hotel, Hot Springs, Va., June 9-11.
AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, 36th spring meeting, St. Lawrence-Saguenay cruise, June 5-9.
AMERICAN WATER WORKS ASSOCIATION, annual conference, Chicago, May 30-June 3.
ARMED FORCES CHEMICAL ASSOCIATION, annual meeting, Army Chemical Medical Center, Md., May 19-21.
CHEMICAL INSTITUTE OF CANADA, Halifax, N. S., May 30-June 1.
CHEMICAL MARKET RESEARCH ASSOCIATION, annual business meeting, New York City, June 9.
HEAT TRANSFER AND FLUID MECHANICS INSTITUTE, University of California, Berkeley, Cal., June 22-24.
INSTITUTE OF FOOD TECHNOLOGISTS, 9th annual meeting, San Francisco, July 10-15.
INTERNATIONAL INVENTORS EXPOSITION, Grand Central Palace, New York City, June 4-11.
MANUFACTURING CHEMISTS ASSOCIATION, annual meeting, Skytop, Pa., June 2.
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, food technology program, Cambridge, Mass., June 13-July 1.
NATIONAL ASSOCIATION OF INSECTICIDE AND DISINFECTANT MANUFACTURERS, midyear meeting, Drake Hotel, Chicago, June 13-14.
NATIONAL ASSOCIATION OF PURCHASING AGENTS, annual international convention and show, Chicago, June 20-22.
NATIONAL FERTILIZER ASSOCIATION, convention, Greenbrier Hotel, White Sulphur Springs, W. Va., June 13-15.
PROPRIETARY ASSOCIATION OF AMERICA, scientific section meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 1-3.
SECOND PACIFIC CHEMICAL EXPOSITION, San Francisco, Nov. 1-5.
SOCIETY OF APPLIED SPECTROSCOPY, symposium, Brooklyn Polytechnic Institute, Brooklyn, N. Y., May 21.
SOCIETY OF CHEMICAL INDUSTRY, 68th annual general meeting, Manchester, England, July 11-15.
SOCIETY OF THE PLASTICS INDUSTRY, annual conference, Edgewater Beach Hotel, Chicago, May 26-27.
SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION, Shawnee Inn, Shawnee-on-Delaware, Pa., June 7-9.
TWENTY-SECOND EXPOSITION OF CHEMICAL INDUSTRIES, Grand Central Palace, New York City, Nov. 28-Dec. 3.

ISCOOPERATION News

MAY, 1949

Call for Gum Karaya!

If your process specifies Gum Karaya, call for Isco Gum Karaya. Our Jersey City laboratories have observed the action of Karaya solutions over an extended period of time. They have charted the increase and decrease or viscosities. Every shipment is put through the rigid ISCO "color control" process. Other standard ISCO tests assure the uniformity of ISCO GUM KARAYA.

Some of the grades—
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Superfine, Superior, Selected, Extra, Crystal
Grades for Pharmaceutical and Special Uses.

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CLEVELAND
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PHILADELPHIA

ISCO

PERSONNEL

Company Officers

• P. A. Singleton has been appointed vice-president of New England Alcohol Co., Boston, Mass., a Monsanto Chemical Co. subsidiary. He was formerly assistant to the president of Monsanto.

• Chas. Pfizer & Co., Inc., chemical manufacturers, announce that John J. Powers, Jr., secretary of the company, has been elected to the board of directors. Mr. Powers joined Pfizer in 1941 as head of

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BARRETT* PHTHALIC ANHYDRIDE



Barrett phthalic anhydride is a pure white flake product of unsurpassed excellence and uniformity.



Its molten color is practically water-white . . . and it retains this color far longer than any normal requirement for processing in plant kettles.



It is free from materials which cause premature gelling and foaming, and it contains a minimum of fines, insuring uniform reaction speeds which are slow and easy to control.



It is ready for use, and because of its free-flowing properties, it can be fed directly to processing equipment.



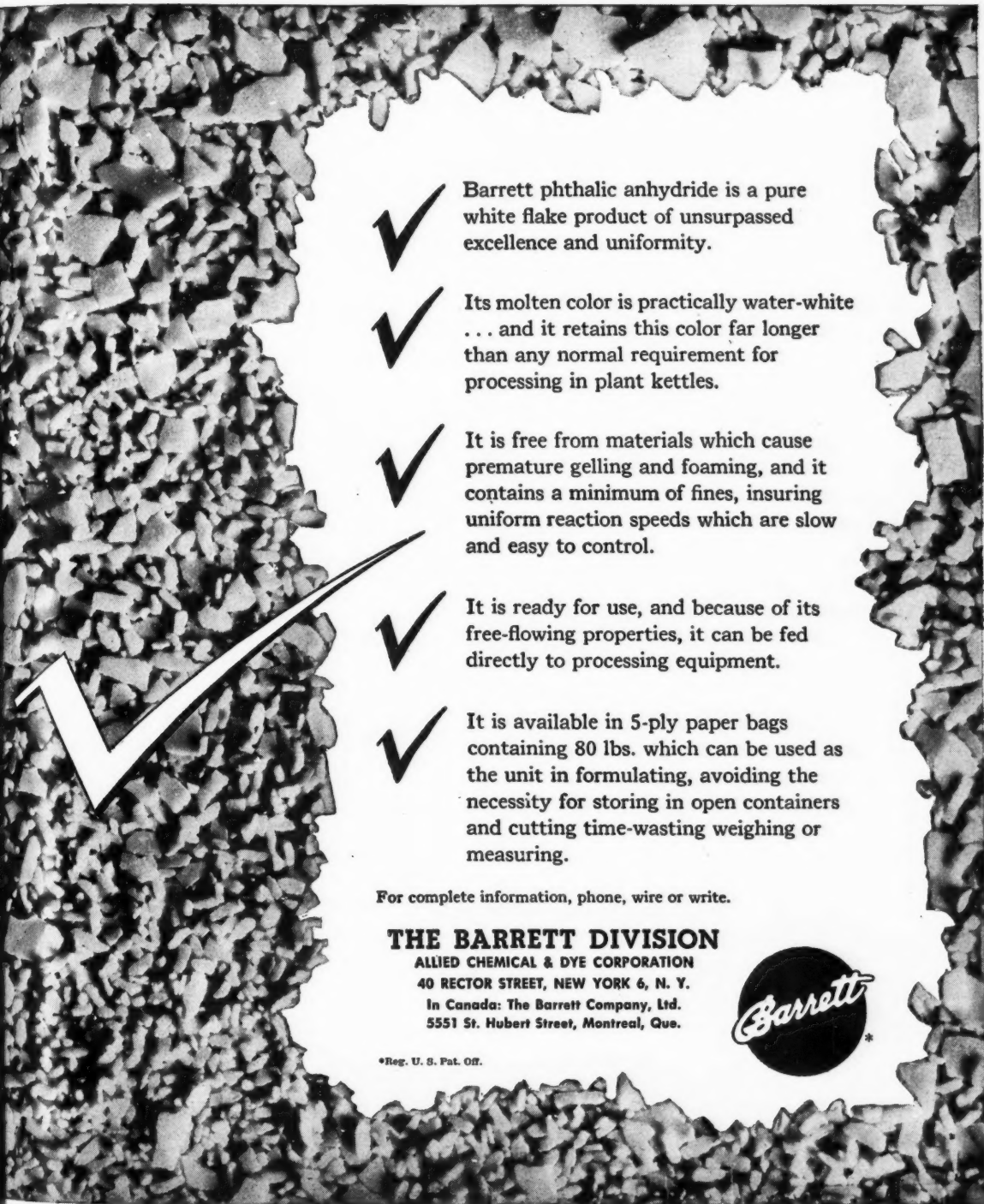
It is available in 5-ply paper bags containing 80 lbs. which can be used as the unit in formulating, avoiding the necessity for storing in open containers and cutting time-wasting weighing or measuring.

For complete information, phone, wire or write.

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AMMONIUM SILICO FLUORIDE

MAGNESIUM SILICO FLUORIDE

SODIUM SILICO FLUORIDE

ZINC SILICO FLUORIDE

POTASSIUM SILICO FLUORIDE

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THE value of long experience in the manufacture of specific chemicals is that most of our failures or errors belong to a distant past. So in all our products we are able to maintain the exacting standards of quality we have established. "Experience is the best teacher" is a great deal more than a school book maxim to us.

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Plant and Main Office:

NIAGARA FALLS, NEW YORK

New York Office:

19 RECTOR STREET, NEW YORK 6, N. Y.

the then newly formed legal department and has also served as assistant to the president.

• Roy N. Wismer has been elected president of Michigan Chemical Corp., Saint Louis, Michigan. Col. T. C. Davis, who has been president, has been named chairman of the board.



George L. Parkhurst, elected vice-president of Standard Oil Co. of California. He is president of Oronite Chemical Co., Standard chemical products marketing subsidiary.

• Directors of the Glidden Co. have elected Clifton M. Kolb senior vice-president and member of the executive committee. He has been secretary of the company since 1929.

• Bareco Oil Co., of Tulsa, has appointed Bruce N. Clary a vice-president and director of that firm. He was first employed by Bareco in 1934 and has been the head of the refinery sales of the wax division since its inception in 1940.

• Meredith, Simmons & Co., Ltd., the Canadian subsidiary of National Starch Products, Inc., has elected Arthur B. Meredith to chairman of the board. Other officers include Frank Greenwall, president; Ronald M. L. Francis, executive vice-president and general manager, and Ernest Hofmann, vice-president in charge of operations at Montreal.

• St. Regis Paper Co. has elected Arch Carswell and Reginald L. Vayo vice-presidents.

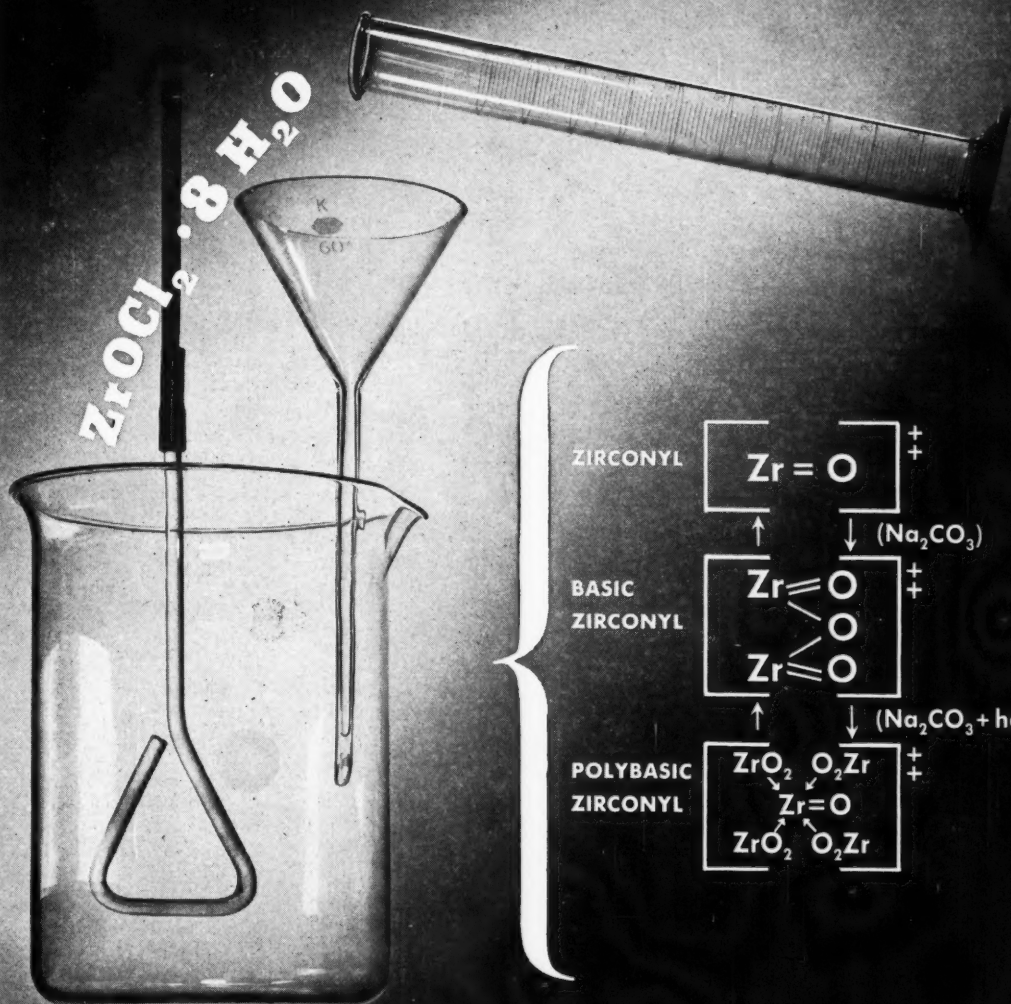
Production

• Harrison C. Givens, Jr., has been named plant manager of the Cumberland, Md., plant of Celanese Corporation of America. He succeeds Fred T. Small, a vice-president and director, who is assuming new executive duties in the New York office.

• John R. Ferree has been named superintendent of production at the Los Angeles, Calif., plant of The Sherwin-Williams Co. He has been associated with the Sherwin-Williams organization for about 16 years.

• Oronite Chemical Co., a subsidiary of Standard Oil Co. of California, has announced that J. T. Deane, vice-president, will move to San Francisco from New

UNUSUAL IONS WITH USEFUL APPLICATIONS



Upon dissolving zirconium oxychloride in water, a number of ionic individuals is obtained. The preponderance of particular ions can be easily controlled by adjusting the temperature and pH of the solution. This permits a surprising number of physical and chemical properties to be realized from this one zirconium salt. These properties have already been successfully exploited

in the preparation of a wide variety of chemical products. Many additional uses are in prospect.

Manufacturers interested in better catalysts, mordants, pigment lakes and toners, leather tanning, pharmaceuticals and numerous other chemical products may obtain detailed information through our New York Office.

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NATIONAL LEAD COMPANY

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Orleans in the near future to take charge of all Oronite manufacturing operations.

• George M. McGranahan has left McCarthy Chemical Co. to join Wyatt C. Hedrick, Inc., Houston firm of architects and builders.

Sales

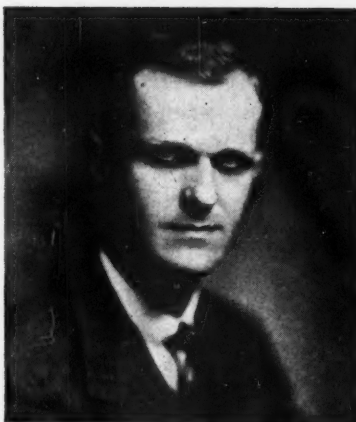
• General American Transportation Corp. has appointed Ben King Duffy as its representative to handle plate and welding and process equipment division sales in its Pittsburgh district.

• William H. Healey, formerly associated with Arthur D. Little, Inc., has been appointed supervisor of market research for Antara Products, a division of General Aniline & Film Corp. He will be concerned chiefly with the division's surface active agents and acetylene chemicals.

• Henry Interdonati, for the past nine years head of the chemical department of S. B. Penick Co., has been named to head the chemical department of George Uhe Co., brokers and selling agents.

• G. W. Fletcher, sales promotion manager of Monsanto (Canada) Limited's Western Division, has been appointed sales manager. The change follows the resignation of George Cullis.

• Milton A. Dixon has been promoted to manager of the lubricating and industrial sales department of Standard Oil Co. (Indiana) to succeed the late Harry J. Saladin.



W. A. Bain, named director of chemical research, The Kellex Corp. He has been assistant to the technical director since 1947.

Research

• Paul R. Austin, an assistant director of the Chemical Department laboratory at Du Pont's Experimental Station, has been appointed director of the Electrochemicals Department's Technical Division; Harold J. Barrett, chemical research manager at the Niagara Falls, N. Y., plant, has been named manager of field research with headquarters here; and Campbell Robertson, manager of chemical research at the Perth Amboy,

N. J., plant, has been named chemical research manager at the Niagara Falls plant.

• Wyandotte Chemicals Corp. recently appointed W. L. Rippeteau as manager of development for the company. He joined Wyandotte Chemicals in 1947 as a contact representative for the new organic and inorganic products being produced by the company.

• John W. Copenhaver has joined The M. W. Kellogg Co. as head of one of its research groups in the Jersey City, N. J., Petroleum and Chemical Research Laboratory. He was formerly with General Aniline and Film Corporation.

• Friedrich Bergius, German scientist and winner of the Nobel prize for chemistry in 1931, died in Buenos Aires on March 31.

Associations

• The officers of the Commercial Chemical Development Association for the 1949-50 operating year are: president, C. D. Goodale, Commercial Solvents Corp.; vice-president, F. A. Soderberg, General Dyestuff Corp.; treasurer, C. W. Walton, Minnesota Mining & Manufacturing Co., and executive secretary, G. O. Cragwall, Charles Pfizer & Co., Inc. New directors are: J. H. Boyd, consultant, New York; John B. Calkin, director of the Department of Industrial Cooperation, University of Maine; A. G. Fisher, Jr., U. S. Industrial Chemicals Co., Inc., and W. B. Plummer, Indoil Chemical Co.

AMERICAN POTASH & CHEMICAL CORPORATION

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METHAMINE USP, 23¢ lb.
MAGNESIUM METAL PDR., 15¢ lb.
TANNIC ACID USP, 92¢ lb.
SAPONIN, \$1.35 lb.
2-4, DICHLOROBENZOIC ACID, 50¢ lb.
MERCAPTO BENZOTHAZOLE, 16¢ lb.
STIMTXO "A", (.43-.5 Pyrethrins) 10¢ lb.
PARIS GREEN, 15¢ lb.
NUCHAR C 115, 4¢ lb.
CARNAUBA WAX COMP., 17¢ lb.
AROCLO, 1270, 12¢ lb.
SILICA GEL, 9¢ lb.
HYDROQUINONE, 70¢ lb.
RED PRUSS. POTASH, 51¢ lb.
ANTHRAQUINONE, 70¢ lb.
POT. METABISULF. ANH. 1 lb. bt., 12¢ lb.
SELENIUM POWDER, 85¢ lb.
ZOPAQUE SD, 17¢ lb.
RED SQUILL 500/600 mg/kg, \$1.00 lb.
SODA HYDROX. CP 1 lb. bt., 19¢ lb.
ALUMINA HYDRATE, 12¢ lb.
SULFAGUANIDINE 1 lb. bt., \$3.80 lb.
HEMATOXYLIN CP 10 gm. bt., \$1.00 ea.
SODA FLUORIDE WH. 1 lb. bt., 8¢ lb.
DIMETH. PHTHALATE, 18¢ lb.

OTHER ITEMS—SEND INQUIRIES

*Chemical
Service
Corporation*

EST. 1925

96 A BEAVER ST., NEW YORK 5, N. Y.

HANOVER 2-6970

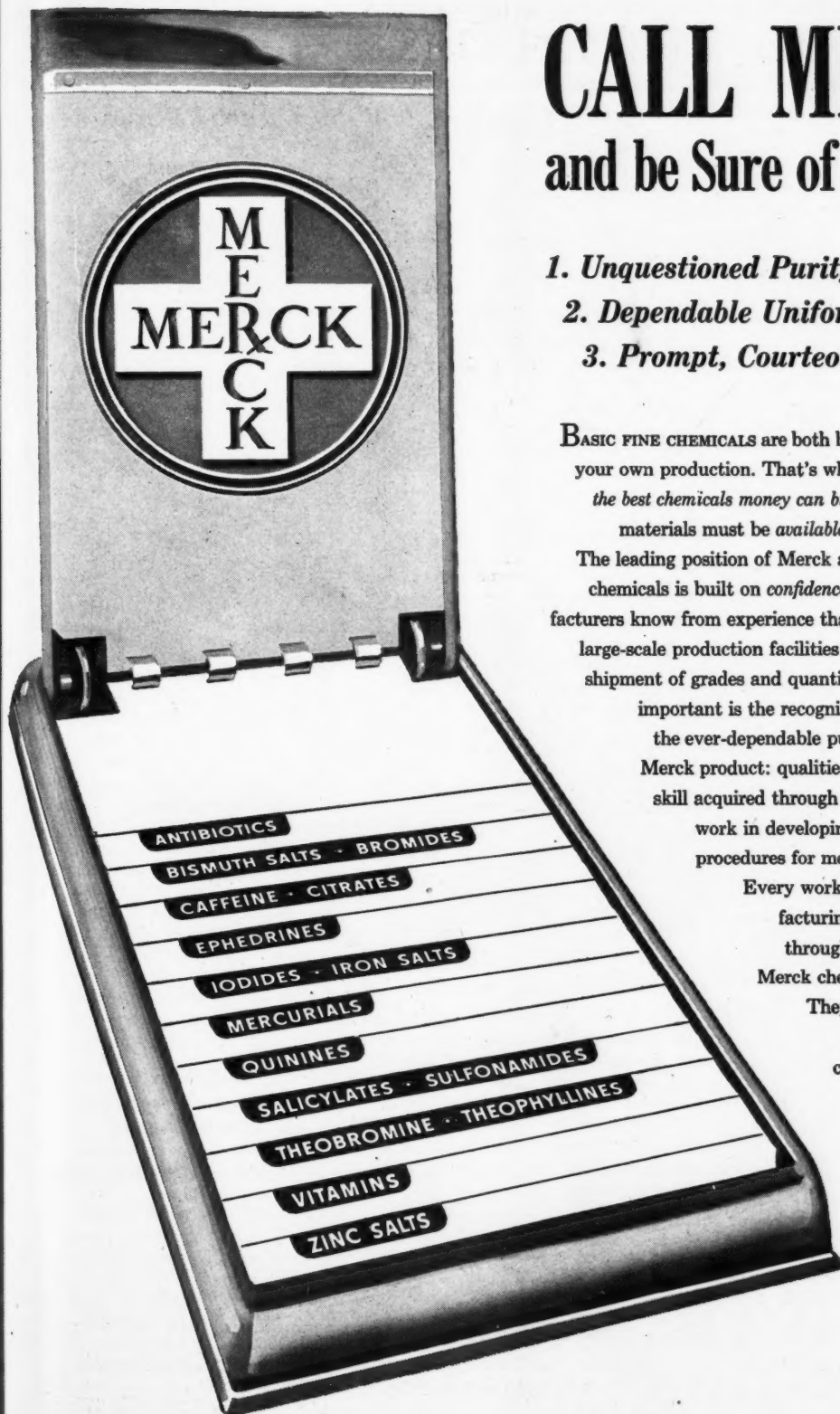
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2. *Dependable Uniformity*
3. *Prompt, Courteous Service*

BASIC FINE CHEMICALS are both backbone and lifeblood of your own production. That's why you insist on ordering *the best chemicals money can buy*; and that's why these materials must be available *whenever you need them*. The leading position of Merck as a manufacturer of fine chemicals is built on *confidence*. Pharmaceutical manufacturers know from experience that the vast resources and large-scale production facilities of Merck ensure prompt shipment of grades and quantity lots required. Equally important is the recognition by chemical users of the ever-dependable purity and uniformity of a Merck product: qualities which are results of the skill acquired through many decades of pioneer work in developing production and testing procedures for medicinally used chemicals.

Every working day, countless manufacturing plants and laboratories throughout the nation are using Merck chemicals in their processes. They have found that Merck quality and service are a combination hard to beat.



MERCK & CO., Inc.

Manufacturing Chemists

RAHWAY, N. J.

FINE CHEMICALS FOR THE PROFESSIONS AND INDUSTRY SINCE 1818

CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

Synthetic Detergents Cut Laundry Bar Soap Sales

Total soap sales to consumers (including synthetic detergents but excluding toilet soaps) have been growing so fast that market saturation may be near. This portends one of the stiffest battles for sales in this industry so famed for keen competition.

The success of the new synthetics, which find their best markets primarily in hard-water areas, has produced an opposite reaction in the field of laundry bar soaps: they are losing ground in hard-water markets but continue to hold their own where the water is soft and synthetics apparently offer fewer advantages.

Such were two major conclusions offered by the Bureau of Advertising, American Newspaper Publishers Association, in new presentation, "Market Trends for Packaged Soaps, Synthetic Detergents and Laundry Bar Soaps," for simultaneous series of showings to advertisers and agencies in the soap-detergent field by the Bureau's New York, Chicago and San Francisco sales staffs.

The new analysis is based on the findings of monthly grocery inventories conducted by newspapers in 12 major markets and coordinated by the Bureau of Advertising's research department.

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Innis, Speiden Switches To Methoxychlor

The Iscomist Cowbomb, a self-propelling aerosol insecticide introduced last year by Innis, Speiden & Co., New York City, for protecting livestock from flies and lice, is now available in a new, improved formulation containing methoxychlor instead of DDT.

In accordance with the U. S. Department of Agriculture's recommendation that methoxychlor be used in place of DDT on dairy cattle, the company has discontinued the use of DDT in the Cowbomb. The company points out that methoxychlor, in addition to its low toxic-

ity, has been found to be as effective as DDT against flies and lice, repels some species of flies not controlled by DDT, and kills DDT-resistant flies.

Hollingshead Establishes New Division, Labs

R. M. Hollingshead Corp., Camden, N. J., has established a New Products Development Division and has formulated plans for several new research laboratories. The new laboratory division is a part of an extensive research program that began shortly before the war and which has led to the development of nearly a score of modern, well equipped laboratories. The firm is manufacturer of chemical products for automotive, aviation, industrial, household, and government use and distributes throughout the world under the Whiz trademark.

The new division will be assigned to new product research and development and two new, fully equipped laboratories are already beyond the planning stage. Among the jobs currently assigned to the new division is the perfecting of a non-inflammable hydraulic fluid for aircraft under a U. S. Navy development contract.

Research operations of the new division will function as a separate organization apart from the firm's many research laboratories. Direction of the new research unit will be in the hands of A. E. Moore, chief chemist, who will be assisted by Vito Esposito.

Army Contracts Awarded

Among the latest contracts awarded by the Department of the Army to private business concerns in amounts of \$100,000 and over were those for 5,689 fire extinguishers (\$100,042) to the Lofstrand Co., Rockville, Md.; 24 reactors, 1,000 gal. (\$158,856) to Glascote Products, Inc., Cleveland, Ohio; and anti-freeze compound as follows:

Contractor	Quantity (Gal.)	Amount
Commercial Solvents Corp.	138,330	\$229,046
E. I. du Pont de Nemours & Co.	211,790	336,746
The Texas Co.	96,230	165,804
National Carbon Co.	296,150	449,480
	450,000	751,500

Fair Trade Campaign

A three-year educational program to protect the present and future of fair trade in the drug industry has been launched through a new Bureau of Education on Fair Trade, established under the auspices of the National Association of Retail Druggists and representing all segments of the drug industry. The active co-operation of retail druggists and others

in the industry will be enlisted for participation in a nationwide campaign in behalf of fair trade.

New Air Conditioner Incorporates Glycols

Ozium, a fast-acting air freshener, that is a new product of Woodlets, Inc., Portland, Pa., is said to eliminate objection-



able odors almost instantly by neutralizing them. The formula is fortified with a high content of propylene glycol and triethylene glycol. These two glycols were used for conditioning the air in bomb shelters during the war.

The freshener is highly concentrated, and packed under pressure in small metal cylinders which slip easily into the patented dispenser, only 4¾ inches long and 1¼ inches in diameter. Designed to fit unobtrusively into the hand, a light touch of the lever on the dispenser releases a fine mist-like spray that quickly diffuses into the air, destroying unpleasant odors. Each refill contains enough to treat the air in about 50 average size rooms—for a fraction of a cent per room.

Sherwin-Williams Unveils New Cotton Insecticide

A new liquid spray concentrate called "Kiltone", containing a combination of toxaphene and DDT, has been introduced by the Sherwin-Williams Co. for cotton insect control. The result of nearly three years of laboratory and field tests, the new concentrate is readily mixable with water, easy to measure and easy to handle.

Only one quart of Kiltone, mixed with two to five gallons of water, provides enough spray for an acre of cotton. Quick, easy spraying is accomplished with Sherwin-Williams' new exclusive low-gallonage "Yellow Devil" tractor sprayer, specifically designed to spray cotton.

Kiltone's residual effect makes it ideally suited for early spraying, counteracting the insects at the start and keeping them under control rather than waiting until an infestation occurs. In addition to cot-



PROTECTION
THAT GIVES
Quality Assurance

THESE DRUMS of fine chemicals are awaiting shipment in the new ultra-modern warehouse of Chas. Pfizer & Co., Inc. at Brooklyn, N. Y. Within each are products of controlled and consistent high quality. Here, in this especially constructed storage area, every effort is aimed at protecting this quality.

For example, in summer and winter, an area of 532,450 cubic feet of storage space is temperature and humidity-controlled. As much air conditioning as 50 average 6-room homes would require! Care in keeping uniform, consistently-regulated atmosphere is widespread; it includes air-lock doors, operated automatically by photo-electric cells so that warehouse interiors are not subject to temperature changes from outside air.

Here many of Pfizer's more than a hundred fine chemicals are assembled in packaged form for shipment to users. It is a source of pride that storage conditions as well as manufacturing controls contribute to Pfizer quality. Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.; 211 E. North Water Street, Chicago 11, Illinois; 605 Third Street, San Francisco 7, Calif.

PFIZER



Manufacturing Chemists Since 1849

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PFIZER



Manufacturing Chemists Since 1849

ton, the new spray method can be used on tobacco, cabbage, onions, beans, potatoes, gladioli and peanuts.

With this new spraying method, growers no longer have to wait for calm weather as they do with dusting. Spraying can be done in winds up to 15 miles an hour, while dusting must be discontinued when the wind reaches five miles an hour, frequently forcing the grower to make night applications or abandon treatments during critical periods.

Cement Replaces Rivets For Brake Linings

Latest of the little-publicized but important new improvements in the automotive field is the use of an adhesive instead

of rivets to attach brake linings to brake shoes. The adhesive is a synthetic material called Plastilock 601 which was developed by The B. F. Goodrich Co. and a major automobile company. The latter has been using it on its trucks for the past 18 months and on its passenger cars since the introduction of the 1949 models.

The adhesive has greater shear resistance than rivet fastening—it will withstand a "pull" of 11,000 pounds per brake shoe compared with 5,000 pounds for rivets—and the brake lining can be worn "right down to the shoe" before need for replacing, instead of only about half way. The absence of rivets is also said to eliminate the possibility of scoring the brake drum.

Insecticidal Coating Offered by Tykor

Insecto-White, an insecticidal white wall coating, has been introduced by Tykor Products, a division of the Borden Co., to combat DDT-resistant flies. This new combination residual insecticide and white wall coating (applied like white-wash) contains 2 new residual insect killers which are claimed to control the DDT-resistant fly. Containing no DDT, it is recommended for use around dairies as well for general agricultural fly control.



K. H. Klipstein, assistant general manager, Calco Chemical Division, American Cyanamid Co., who has been placed in charge of Calco's new research and development department into which its research, process development and dyes technical service departments have been consolidated.

Tide Distribution

Tide, Procter & Gamble's new washing product, is now being distributed nationally. A detergent which combines the known advantages of "soapless suds" with the efficient cleansing action of a heavy-duty agent, it is said to meet the following requirements sought by the average housewife in a general cleaning product:

1. Clean thoroughly, quickly, and easily;
2. Be impervious to the hardness of water;
3. Do a consistently good job;
4. Dissolve quickly;
5. Make rich and lasting suds;
6. Rinse easily;
7. Be kind to skin and fabrics;
8. Be packaged with helpful directions for its use;
9. Be economical;
- and 10. Be readily available.

Solution for Improving Paper Products

A treatment for improving the properties of paper products, like towels and tissues, is described in British patent 592,210, granted to A. E. Broderick. In this method a water-soluble carbohydrate ether, like methylcellulose or hydroxyethylcellulose is converted into a water-insoluble form by treatment with a water-

CHLOROFORM

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★ *Technical*

Chemical Division

McKESSON & ROBBINS INC.

155 EAST 44th ST. • NEW YORK 17, N. Y.

★ *Offices in All Principal Cities* ★

Antara Products
a division of
General Aniline &
Film Corp.

Antara Extra

An Antara Products Publication

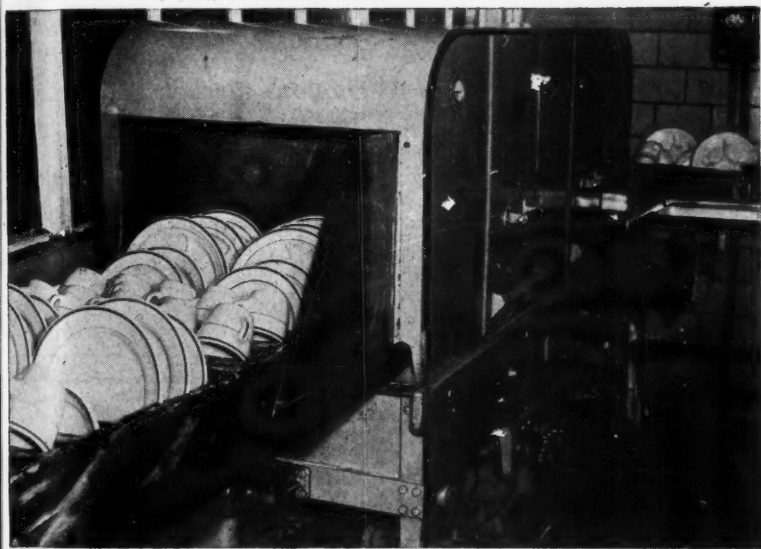
Detergents
Emulsifiers
Wetting Agents
Dispersants
Carbonyl Iron Powder

444 MADISON AVENUE

NEW YORK 22, N. Y.

MAY, 1949

CLEANER-SANITIZERS NOW POSSIBLE WITH ANTAROX* "A-180" AND QUAT COMBINATIONS



Cleaner-sanitizer compounds are called for wherever a detergent is expected to kill bacteria as well as chase away dirt. The application above—cleaning and sanitizing restaurant china, silver, glassware—is typical of the many fields in which these compounds may be used. Full details on compounding such products, in addition to the procedure for registering cleaner-sanitizers, may be obtained by writing to Antara Products.

Soap Compounders Adding Antarox "A-200" for Limesoap Dispersion

The addition of 7% of Antarox "A-200"—a liquid, non-ionic detergent of the aromatic polyglycol ether type—to soap has been found effective in preventing the precipitation of lime soap, up to a hardness of approximately 1,000 ppm., it was revealed this month by the Central Research Laboratory of General Aniline & Film Corp., Easton, Pa.

When Antarox "A-200" is used with soap, according to the laboratory report, limesoap (soap curd) is so finely dispersed that it has very little tendency to stick and is easily rinsed away.

A report of Antarox "A-200" for Limesoap Dispersion is obtainable

for the asking. Write, Antara Products.

Callans to Speak before NAIDM June 13

Lee D. Callans, assistant sales manager, Antara Products, a division of General Aniline & Film Corp., will be one of the speakers at the June 13-14 meeting of the National Association of Insecticide and Disinfectant Manufacturers, Hotel Drake, Chicago. Topic: "Detergent-Sanitizers—Their Value and Possibilities in Industrial Cleaning & Dishwashing."

The formulation of compounds which have outstanding cleansing as well as efficient bactericidal properties now is possible with the use of Antarox "A-180"—an aromatic polyglycol ether (non-ionic) detergent—in combination with cationic quaternary ammonium compounds, according to an announcement made this month by T. R. Moore, sales manager, Antara Products, a division of General Aniline & Film Corp.

According to Mr. Moore, it is the non-ionic characteristics of Antarox "A-180" which are responsible for the compatibility with the cationics. Such combinations, he points out, are not possible with soaps or anionic detergents.

A mixture of Antarox "A-180" with a quaternary ammonium compound will give a remarkably reduced bacteria count on hard surfaces. The compound is easy to formulate into an easy-to-handle clear concentrate which may be diluted to application strength. Best bactericidal action occurs at pH's of 9 to 10.

A typical liquid formulation: Antarox "A-180" . . . 10.9%; Alkyl Dimethyl Benxyl Ammonium Chloride (50% active) . . . 20.0%; TSP 2.8%; Water . . . 66.3%. Application strength 1 oz./5 gals. water.

*®



Antara* Products

GENERAL ANILINE & FILM CORPORATION

444 Madison Ave.
New York 22, N. Y.

soluble aldehyde such as glyoxal or pyruvic aldehyde. The solutions, to which glycerine may be added as a softening agent are useful for impregnating paper towels and tissue papers to impart wet strength and prevent linting. An example of an impregnating solution for paper towels follows:

Hydroxyethylcellulose.....	4.85 parts
Glycerine.....	4.85 parts
Glyoxal.....	1.94 parts
Water.....	988.50 parts

Improved Metal Cement

An improved version of Iron Bound Cement, an air-drying rubber-plastic base for rubber to metal and other hard surfaces, has been developed by Slomon's Laboratories, Inc., Long Island City, N. Y., and is being sold industrially as R.E. Cement.

The new material has excellent adhesion to metal, glass, and other glossy surfaces, as well as to rubber and felt. At present, R.E. is being used by the building trade for felt and rubber to aluminum, steel and other metals.

After the cement has set, it still retains a slight flexibility, but in most cases can not be removed without the use of a hammer and cold chisel. R.E. adheres to all types of metals, but does not effect or corrode the surface. It is durable under flex and is impervious to all types of unfavorable weather conditions.

New Fabric for Car Tops

A new top fabric for recovering convertible automobiles has been developed from Vinylite resins fused to cloth woven of Fiberglas yarns, producing a material of maximum strength which will not stretch or shrink as well as having resistance to wearing stress, weathering, mildew, fire, oils, greases, and other elements that cause deterioration of ordinary top fabrics.

Known as Cordoglas and developed by the Cordo Chemical Corp., Norwalk, Conn., the fabric is produced by a process of coating and protecting the Fiberglas yarns with Vinylite resins so that the fibers get a minimum of movement and are therefore subjected to the least amount of wearing stresses.

Non-Foaming Compound For Spray Booths

The DuBois Co., Cincinnati, Ohio, has developed Differentiated Klarifant, a non-foaming water wash spray booth compound.

Because of its non-foaming characteristics, higher concentrations can be used which in turn keeps the hydraulic system of the spray booth absolutely clean. This material is recommended for use in the

newer down-draft booths where even the slightest amount of foam is objectionable. It controls paint overspray effectively and will keep booths cleaner longer.

New Detergent for Surgical Scrubbing

A two-minute preoperative scrub for surgeons and nurses is provided by a new antiseptic, soapless, sudsing agent known as pHisoderm-Hexachlorophene 3%, which also gives added protection against cross-infection. It is a development of Winthrop-Stearns, Inc., pharmaceutical manufacturers, of New York and Rensselaer.

Extensive laboratory and clinical research has proved that the disinfecting action of pHisoderm fortified with 3% hexachlorophene is so rapid that a two-minute preoperative scrub is bacteriologically feasible.

Du Pont Markets TCA As 60% Sodium Salt

The Du Pont Co. is marketing its trichloroacetate weed killer (CI, April 1949, p. 566) as the 60% sodium salt. The new chemical for control of noxious grasses which have resisted other weed killers, is believed of value to industries, railroads, government agencies, and ranchers, as well as to agriculturists.

40 "ESTAX EMULSIFIERS" at your Service—

and a technical staff to solve your emulsifications and formulation problems!

TYPICAL SELECTION:

- Estax 5 (Glyceryl monostearate): Food emulsions.
- Estax 28 (Amino alkyl oleate): Oil additive for Leather. Acid stable.
- Estax 36 (Poly-oxy ethylene ester): Cutting oils.
- Estax 37 (Poly ethylene oxide ester): Paper manufacture, textiles.

NEW RESINS

for Leather and Paper Industries.
Resistant Coatings, High gloss,
Water resistance finishes.

CHEMICALLY PURE SULFATES

Magnesium Sulfate, Barium Sulfate, Sodium Sulfate.

"ESTER"-WAXES

Excellent blending and hardening with mineral waxes to give ceresines, special polish waxes, wax coatings, etc.

PENTAERYTHRITOL

Esters and Ethers for Paint and Plastics.

PHARMACEUTICAL CHEMICALS

Ephedrine Hydrochloride
Calciferol
Ergosterol

Cholesterol
Procaine
Methiomine

Theophylline
Acetarsone
Pentamethylene tetrazol

WATFORD CHEMICAL CORPORATION

25 WEST 44th STREET, NEW YORK

TELEPHONE: VAnDerbilt 6-0171

Cowles CHEMICALS

DRYMET*

The Economical Detergent Silicate

Cowles DRYMET, anhydrous sodium metasilicate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both Na_2O (alkalinity) and SiO_2 (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

CRYSTAMET*

The Medium pH Detergent Silicate

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble — chemically stable — easy to handle. Can be used on medium pH jobs.

DRYSEQ*

The All-Purpose Detergent Silicate

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% Na_2O —making it an economical base material for compounding.

DRYORTH*

The Heavy-Duty Detergent Silicate

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% Na_2O , which may also be used as an economical constituent of high pH cleaning compounds.

We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.

*Reg. U. S. Pat. Off.

PROMPT SHIPMENTS FROM CONVENIENT WAREHOUSE STOCKS

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CHEMICAL MARKETS

Cheaper Flaxseed Augurs Lower Paint Prices

The lowering of the price support level for top grade flaxseed of the 1949 crop to \$3.99 a bushel, Minneapolis basis, from the 1948 support price of \$6 a bushel, will add to the pressure on paint manufacturers to lower prices. Linseed oil has been selling at about 28 cents a pound, but with the new levels for the flaxseed from which it is obtained one-third lower, the price can be expected to fall to about 18 cents later in the year.

Linseed oil is but one of the raw materials for paint which either has or will come down in price. Coupled with declining sales of paint, these lower raw materials prices will probably force some reduction in paint prices. Other oils that have come down are soybean, now at about 11 cents a pound as contrasted with 29 cents last summer, and tung oil, now at about 20 cents a pound as contrasted with about 23 cents last summer. Lead pigments have come down considerably since the first of the year, and turpentine currently at 40 cents a gallon, is more than a third cheaper than it was last summer. Rosin, too is off about twenty-five per cent since last fall. Resins are in a decline, and only recently the price of glycerine which goes into alkyds was reduced 15 cents a pound.

Fertilizer Tag Sales At All-Time High

Fertilizer tax tag sales reached an all-time record for a single month during March. Figures received by The National Fertilizer Association from control officials in the 14 States which require the use of the tags reveal that that month's sales represent the equivalent of 1,922,000 short tons of fertilizer. Combined with January sales and the 12-year monthly sales peak reached in February, the March totals brought sales for the first quarter of 1949 to 4,680,000 tons, far surpassing the comparable total for any previous year, despite a slow start in January.

The tonnage represented by last month's tag sales was approximately one-third higher than that of the same month last year and 82 per cent greater than that of 2 years ago. Sales in March, as percentages of yearly totals, have been declining during the past several years as the result of changes in the seasonal distribution of sales. Thus, in 1935, March sales represented about 34 per cent of the year's

total; by 1940 this figure had dropped to 30 per cent, and in 1948 to 16 per cent of total sales for the year.

Metals Slow Despite Cuts

The series of spectacular price reductions in lead, zinc, and copper from their record high prices have failed to stimulate much buying as consumers are sitting it out in anticipation of further cuts. In large part, the reductions that have occurred thus far have been forced by the disinterest of industrial buyers.

Lead was the first to break, and the first reduction was followed by five successive drops that brought it down to 15 cents a pound from its all-time high of 21½ cents that had prevailed since last November. Zinc followed the trend with a series of four slashes that toppled the 17½-cents-a-pound price to 13 cents. Following a token reduction of ¼ cent, two other cuts by a leading custom smelter brought copper down to 20 cents a pound from 23½ cents. Although major mine producers are still holding the price at old level, one Canadian producer has reduced its price 2 cents to 21½ cents a pound.

Producers say that the prevailing high cost of labor and materials will mitigate against further price cuts, and that production may have to be curtailed. Most of the larger mines can operate profitably at the new prices, but marginal producers may be forced out.

Although some benefits have already accrued to chemical consumers in the form of lower prices for metallic chemicals, the full advantage cannot be realized until inventories accumulated at the higher levels are depleted.

Organic Production Dips

Production of most synthetic organic chemicals for the month of February was lower than for January, according to the United States Tariff Commission. Following are the production figures of those materials for which substantial declines had been made for the fewer working days in February: acetic acid, synthetic, 32,884,584 lbs. (6%); acetic anhydride, 57,807,102 lbs. (3.4%); acetone, 35,854,942 lbs. (8%); carbon disulfide, 31,911,977 lbs. (6%); monochlorobenzene, 23,176,697 lbs. (10%); cresylic acid, 1,650,716 lbs. (16%); dibutyl phthalate, 897,549 lbs. (5.5%); ethyl acetate, 3,653,222 lbs. (40%); ethylene glycol, 25,021,091 lbs. (16%); naphthalene (from tar distillers),



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13,616,183 (40%); phenol, 21,239,934 lbs. (12%); phthalic anhydride, 12,814,553 lbs. (13%); and tricresyl phosphate, 783,718 lbs. (17%).

Increases were registered by aniline, barbituric acid, benzene, *n*-butyl alcohol, creosote, meta-para cresols, ethyl ethers, benzene hexachloride, and toluene.

Inorganic Production Somewhat Lower

United States production levels of industrially important inorganic chemicals for February 1949 were generally lower than those reported for January 1949 and about the same as for February 1948, according to the Bureau of the Census. Decreases from January 1949 quantities were reported for 28 of the 35 chemicals included in the Bureau's continuous monthly survey, while increases were reported for 4. Seventeen of the 35 chemicals were produced in larger quantities during February 1949 than during February 1948, while 15 were produced in smaller volume.

Of the "heavy volume" chemicals, production gains over the preceding month were reported only for synthetic ammonium sulfate. The 60,975 short tons produced in February 1949 represent an all-time monthly high and exceed by about 15 per cent the previous high of 52,836 short tons for this chemical reached in December 1948.

Coal-Tar Imports Decline

In 1948 imports of coal-tar intermediates under paragraph 27 of the Tariff Act of 1930 totaled 2 million pounds compared with 2.6 million pounds in 1947, and 3.1 million pounds in 1946. In terms of quantity, imports in 1948 came chiefly from Belgium, the United Kingdom, Germany, and Italy; in terms of value, however, Switzerland was first, followed by Belgium, the United Kingdom, France, Italy, and Germany. For the first time since before the war sizable imports of coal-tar intermediates, in both quantity

and value, were reported from both Germany and Italy. The most important intermediates imported in 1948, in terms of quantity, were phthalic anhydride, for alkyd resins, plasticizers, and dyestuffs, principally from Belgium and Italy; *o*-cresol, for the plastics industry, from

the United Kingdom, Australia, Canada, and Switzerland; and β -naphthol, for the dye industry, principally from Germany.

Copies of the report from which these figures were obtained may be obtained by writing the United States Tariff Commission, Washington 25, D. C.

Market Review

The chemical market followed the general business pattern with lowered prices and ample supply characteristic of the situation. Buying was dull as most consumers pared inventories and waited for prices to reach rock bottom.

Prices for metallic chemicals were adjusted downward in accordance with the drop in the metals market, but in some materials, such as lead arsenate, there was a tendency to hold prices on stocks built at the higher cost. Lead acetate was reduced \$1.50 a cwt. to establish a price of \$23.75 for the crystals, and \$24.50 for granular or powdered. Declines in copper sulfate brought the crystals to \$7 a cwt., but demand was poor. Lead-containing pigments were reduced $\frac{1}{2}\phi$ to 1ϕ a pound. Stearates, naphthenates, and tetraethyl lead were all reduced.

Alcohol, which failed to recover from the drastic reductions of the past few months, remained at 21¢ a gallon, tax-free in tankcars. There was an increase of $\frac{1}{2}\phi$ a gallon in blackstrap molasses to bring the price to 6 $\frac{1}{2}\phi$, f.o.b. New Orleans. A reduction of about one-third in the retail price for ethanol-based anti-freeze by Publicker Industries, Inc. put it in a better position to recapture some of this market lost to methanol.

Insecticides continued to move very slowly, but fertilizers began to pick up, particularly in the South. Uramon was advanced \$5 to \$98 a ton, while calcium phosphate, tribasic, at \$6.50 a cwt., carload lots, works, was down 10¢. United States Potash Co. began

to accept orders for both chemical and agricultural grade muriate potash and manure salts for the new season at the same prices as the 1948-49 season.

There at last seemed to be enough oxalic acid, with little interest shown at 18¢ a pound. Hydrofluosilicic acid was reduced 3¢ a pound to 5¢ a pound in 420-pound barrels or 100-pound rubber drums. With ample supplies of acetic acid on hand, the tankcar price of glacial acetic was lowered to \$7.50 a cwt., f.o.b., works.

Declines in fats and oil prices caused further cuts in wholesale prices of household soap—6 per cent by Lever Bros. and Colgate-Palmolive-Peet, and 4 to 8 per cent by Procter & Gamble.

Very little upswing was noted in glycerine purchases following the recent break in price as consumers bought for immediate needs. A sharp break in pentaerythritol that brought the carlot price to 29¢ a pound was attributed to the glycerine decline. Sorbitol was reduced from 25.1¢ to 22.5¢ a pound in tankcars, latest in a steady decline tied to process improvements.

A generally easy tone prevailed in coal-tar chemicals, some of it being laid to slowness in lacquers. Following a reduction on high flash naphtha by the petroleum industry, coal-tar naphtha was also lowered—to 29¢ a gallon in tankcars. A change from 30¢ a gallon, delivered to 28¢, f.o.b. terminal, for toluol and xylol by petroleum producers was also followed by similar adjustments by some coal-tar producers.

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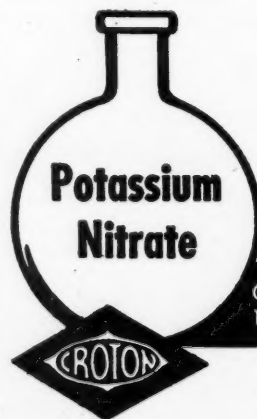


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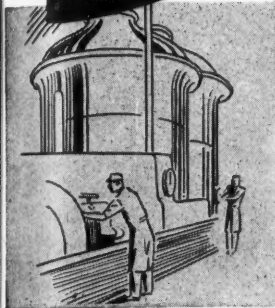
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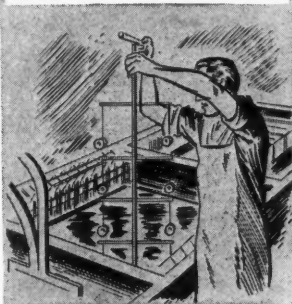
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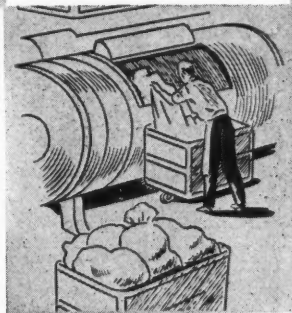
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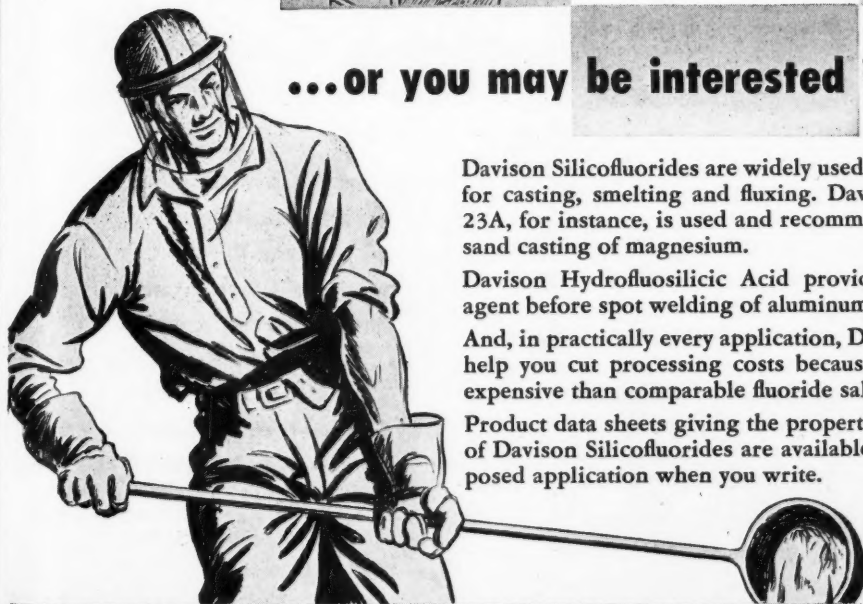
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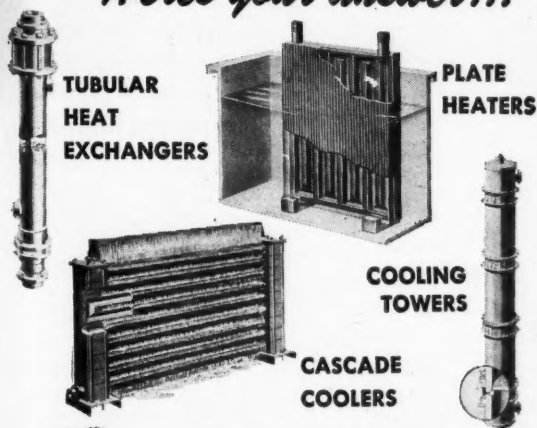
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Product listing questionnaires for this new edition have just been mailed. If you have not received yours, write *immediately* to Buyers Guide Section, Chemical Industries, 522 Fifth Avenue, New York 18, N. Y.

Chemical Industry, 1948

(Continued from page 753)

vert City, Kentucky, plant for hydrofluoric acid and related products nearing completion.

Construction Policy: No further major plant expansion contemplated in 1949.

Research: Major part of research and development effort directed toward fluorine and chlorine chemicals.

MATHIESON CHEMICAL CORP.

Sales: \$31.9 million.

Expansion: \$15.8 million (1947 plant: \$51.4 million).

Facilities Expanded: WAA synthetic nitrogen plant and ammonia oxidation units at Lake Charles purchased for \$7.1 million. Balance principally for Saltville and Lake Charles expansion and modernization.

Research: Activities intensified with efforts directed toward conversion of present heavy chemicals into chemical compounds needed by industry. Interest in Mathieson stationary mercury cell growing and arrangements made to handle engineering and installation for additional licensees.

VICTOR CHEMICAL WORKS

Sales: \$25.8 million.

Expansion: \$3.4 million (est.).

Expanded Facilities: Post-war construction program completed except a \$300,000 addition at Morrisville, Pa.

Research: \$520,000.

HOOKER ELECTROCHEMICAL CO.

(Year ended Nov. 30)

Sales: 23.7 million.

Expansion: \$5.3 million.

Expanded Facilities: Benzene hexachloride in full-scale production. Phosgene production expanded. Dimethyl urea and phenyl isocyanate now in production. Added chlorine, caustic, and steam facilities at Tacoma.

Research: 1948 expenditures highest in their history. Several university fellowships. Pilot plant expansion planned. New high capacity fluorine cell developed during war. Several fluorine compounds introduced. Studying monochloroacetic acid derivatives. New chlorinated hydrocarbons in pilot plant production.

NOPCO CHEMICAL CO.

Sales: \$20.1 million.

Expansion: Several newer type detergents produced in volume for first time.

Research: \$278,000. Staff enlarged. Several resin emulsions introduced. Work on quaternary ammonium salt bactericides. Several new hormones and antiseptic products added. New water-soluble Vitamin A and D concentrate introduced.

DEWEY AND ALMY CHEMICAL CO.

Sales: \$15.9 million.

Expansion: \$900,000.

Facilities Expanded: Cry-O-Vac operations, including Cry-O-Rap shrinkable wrap for frozen foods, concentrated in Lockport, N. Y.

Construction Policy: Major plant program completed.

Research: \$800,000. Staff: 150 or approximately one in ten of all company employees.

SHELL OIL CO.

Expansion: At Houston the world's first synthetic glycerine plant and the synthetic alcohol plant were placed in operation. Other facilities completed included those for secondary butyl alcohol, methyl ethyl ketone, ethyl chloride, hexylene glycol, and liquefied propane. At Shell Point ammonia capacity was further increased and the ammonium sulphate plant enlarged and modernized. At Dominguez acetone facilities were increased. At Martinez plants were completed for two lubricating oil additives, Ionol and octyl formol.

Research: \$10 million. Included intensive work on lubricant, synthetic detergents and surface coatings. The Agricultural Laboratory program was continued.

KOPPERS CO., INC.

Sales: \$201 million.

Expansion: \$10.5 million.

Facilities Expanded: Large addition to Kobuta, Pa., polystyrene and ethylene facilities. Extensive additions and improvements at the Oil City, Pa., alkylation plant and the Petrolia, Pa., sulfonation plant. Kearny, N. J., sulfuric acid and cyanide plant in experimental operation. Tar base plant improvements begun at Folsom, W. Va. Kobuta phthalic anhydride facilities doubled, title transferred to Koppers-Pittsburgh, owned jointly by Koppers and Pittsburgh Glass.

Research: New heat-resistant polystyrene developed. Development work on new resins and adhesives.

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CELANESE CORP. OF AMERICA

Sales: \$230 million.

Expansion: \$41.1 million.

Facilities Expanded: Cellulose acetate filament yarn plant near Rock Hill, S. C., brought into production. Prince Rupert, B. C., cellulose plant under construction. New staple fibre facilities near Narrows, Va. Film facilities being expanded. Methylal produced in quantity for first time. Several chemicals produced in development quantities. Cellulose nitrate discontinued. All molding materials production transferred to Belvidere, N. J.

Construction Policy: Current program of plant additions in U. S. substantially complete.

Research: \$3.2 million. Emphasis on cellulose, chemical wood pulp, by-products of wood pulp, cellulose esters, yarn, plastics, dyestuffs, and organic chemicals from petroleum gases. Fortisan adopted as covering fabric for several U. S. Navy airships. New markets developed for cellulose propionate. Improved flame-resistant cellulose acetate molding material received Underwriters' approval. Five graduate fellowships established. Company contributing to support of a nuclear studies project at University of Chicago.

PITTSBURGH COKE & CHEMICAL CO.

Sales: \$20.6 million.

Expansion: \$2.46 million.

Facilities Completed: Phthalic anhydride plant, tar base pipe enamel plant, and agricultural chemicals formulating plant to formulate the company's own 2-4 D, DNOC (dinitro-orthocresol), and parathion. Agricultural chemical sales and technical organization developed.

Research: Modern pilot plant constructed and new research laboratory nearing completion.

PITTSBURGH PLATE GLASS CO.

Sales: \$280 million.

Expansion: \$21 million.

Expanded Facilities: Chlorobenzene plant nearing completion at Natrium, W. Va. Added chlorine and caustic facilities at Natrium. Kobuta-Pittsburgh Co., formed jointly with Koppers to produce phthalic anhydride at Kobuta, Pa. Paint raw material expansions.

Research: Research on agricultural chemicals including insecticides and herbicides. Benzene hexachloride in pilot plant production. Extensive activity in rubber reinforcing pigments. Television glass and fume-resistant paint research. Participation in program at University of Chicago's Institute of Nuclear Studies to determine possible application of atomic energy to production problems.

NATIONAL DISTILLERS PRODUCTS CORP.

Expansion: National Distillers Chemical Corp., wholly-owned subsidiary, formed for company's industrial chemical operations. Company to construct a metallic sodium and chlorine plant at Ashtabula, Ohio, under already obtained DuPont licenses.

SCHENLEY DISTILLERS CORP.

Research: Devoted primarily to antibiotics. Research on penicillin production and dosage forms. Process developed for commercial production of streptomycin.

Paris plant of Societe Francaise de la Penicilline commenced production July, 1948, using Schenley know-how.

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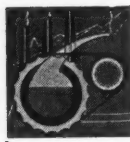
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Packaging & Shipping

(Continued from page 818)

(b)(3) Spec. 1A or 1D.—Carboys,
glass, boxed, capacity not over 5 gal-
lons for Spec. 1A, and 6.5 gallons for
Spec. 1D.

The purpose of this amendment is to
provide for packing and shipping of nitro-
hydrochloric acid and nitrohydrochloric
acid diluted.

Section 73.303 (formerly sec. 303 (k))
was amended as follows:

Kind of Gas	Maximum permitted filling density (See sec. 73.303 (h)).	Cylinders marked as shown in this col- umn must be used except as provided in Note 1 and 73.303(p) (2) to 73.303(p) (6).
(Change) Carbon dioxide—nitrous oxide mix- tures	Percent 68	ICC—3A1800; ICC-3
(Change) Chlorine (See Note 6)	125	ICC-3A480; ICC-25; ICC-3
(Change) Nitrous oxide (See Note 2)	68	ICC-3A1800; ICC-3
(Add) Cyclopropane	55	ICC-3A225; ICC-3B225; ICC-4A225; ICC-4B225; ICC-4BA225; ICC-7-300; ICC-3; ICC-3E1800.

Section 73.303 (formerly sec. 303
(q) (1), part of table is amended as fol-
lows:

tainers must be filled so that will not
be liquid full at 130° F.

The purpose of this amendment is to

Kind of Gas	Maximum permitted filling density Note 1	Required type of tank car, Note 2, or Motor vehicle
(Add) Dispersant gas, N.O.S.	Note 18	ICC-106A500
(Change) Hydrogen sulfide	Percent 68	ICC-106A800, Note 14

provide additional type container for the
shipment of nitrogen tetroxide.

Paragraph 73a.5M-7 (formerly par. 7
of Spec. 5M) is amended so that its
marked capacity is not over 55 gallons.

The purpose of this amendment is to
provide a larger container for shipments
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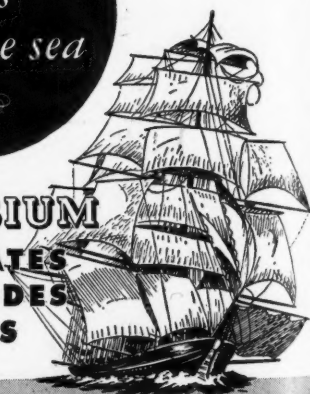
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Important Questions...

about iron and steel scrap
for every top business man in every industry

Q. How bad is the shortage of scrap?

A. Actually, we have enough scrap to get along, but too much of it is *light* scrap. What is badly needed today is more *heavy* scrap.

Q. Why more heavy scrap?

A. Because heavy scrap will produce *more and better* steel in less time.

Q. Why is the heavy scrap shortage so harmful to our economy?

A. Half of all the ingredients that are melted to make steel and castings consists of scrap iron and steel. The short supply of heavy scrap during the past year limited the production of steel mills and foundries. At the present record rate of production, there is still not nearly enough steel to meet the current and anticipated demands of our domestic economy, military requirements, and ERP. More heavy scrap will help bridge the gap.

Q. What's being done about it?

A. A drive . . . and everybody is cooperating . . . is being started for industrial scrap, to (1) help step up present steel production, and (2) *create a visible reserve of heavy scrap in the event of national emergency.*

Q. Why is there a shortage of heavy scrap?

A. Several reasons:

1. Very little of the 123,000,000 tons of steel and steel products exported during the war has come back as scrap.
2. With replacements scarce and expensive, much old equipment which would normally have been junked by now, is still in use.
3. A halt has been called on the junking of old vessels and military equipment which has until recently been a source of scrap.
4. The amount of heavy scrap produced in fabrication—the left-overs of machinery, etc.—is not enough to meet the demand for new steel and castings.

Q. How about the heavy scrap that must exist in huge quantities in Germany and Japan?

A. Some of this will be coming through, but not in good quantities until preparation and transportation facilities within those countries improve.

Q. Where can additional scrap be obtained from domestic sources?

A. From industrial plants which have on hand large amounts of heavy scrap in the form of obsolete machinery, idle equipment—tools, dies, jigs, fixtures, etc.—and unnecessarily large repair parts inventories. Such scrap is the best possible type for the manufacture of quality steel.

Q. Isn't such material ordinarily turned in as scrap?

A. Experience shows that plant "housekeeping" is not particularly good when plant production is high. People are too busy. However, if executives realized the critical situation, they would order the necessary steps to be taken.

Q. How can I help in this drive?

A. Appoint one top official in your plant as a Salvage Director—with full authority to give orders and throw out everything that is not going to be needed. Have him consult with your trade association's Steel Scrap Drive Committee. Call in your local scrap dealer. (Incidentally, the prices paid for scrap are the highest ever.) Promote your scrap drive by meetings of department heads and through plant bulletin boards and newspapers.

Q. How do I benefit from moving scrap in addition to the money received for it?

1. You get the use of much-needed and expensive floor space now occupied by such equipment and material.
2. You eliminate the cost of keeping records and inventory.

Q. When does the scrap drive start?

A. Right this minute. The very next thing to do after reading this page, should be to start your plant's scrap drive!

Q. What is the goal of this drive?

A. One million tons of heavy scrap . . . and "housecleaning" in your plant will help.



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Search your plant for HEAVY SCRAP ... Help make MORE STEEL!

CHEMICAL INDUSTRIES

FROM WHERE WE SIT

by "DOC"

IT WAS NAPOLEON, if we remember correctly, that said an army moves on its stomach. The U. S. Army is sure going to follow that maxim, judging from the fact that the N. Y. Quartermaster Office just placed an order for 315,650 million paper napkins. That's enough, we calculate, to supply an army of two million men eating three meals a day for 144 years, 1 month and 17 days.



ONE OF THE NON-TECHNICAL fellows in the office—who should have known better—picked up a copy of the *Record of Chemical Progress* and started riffling through the pages. He was stopped cold by the sentence: "The simplest substances of this type contain three identical coordinating groups, and might be expected to exist in eight different forms—DIII, DIIId, DIId, Dddd, LIII, LIId, LId, and Lddd." We had to explain to him that it wasn't the name of a law firm or a brokerage house.



YOU NEVER KNOW what you're going to get into in the chemical business. We just heard the other day about Bob Sterling, the chemist at Westinghouse who is chiefly responsible for the new insulating foam recently announced by the company. Because he wanted a product as light as pie meringue, he very sensibly decided to study pie meringue, and so he got hold of a home economist to answer his questions. The sequel is as obvious as it is familiar: He married the gal!



COME TO THINK OF IT, a girl who bakes a sound and tasty pie has a better chance than most of catching a chemist. It's a matter of conditioned response. Chemists are taught—at least they were in our day, by "Speed" Marvel at the University of Illinois—to remember the simple hydrocarbon radicals, methyl, ethyl, propyl and butyl, by the mnemonic injunction: "Make every pie better."



MNEMONICS MAKES US think of the time during which we were a chemist in Philadelphia and had occasion very often on Friday and Saturday nights to take the Paoli Local to Bryn Mawr—to con-

FIFTEEN YEARS AGO

(From Our Files of May, 1934)

Chemical industry leaders sign letter to congressmen protesting "strangling regulation" of industry implicit in bill to regulate stock exchanges.

Harry L. Derby, Cyanamid president, represents chemical industry in hearing before the Senate Finance Committee to protest the proposed reciprocal tariff measure.

With less than 12 hours' notice a group of National Aniline's Buffalo employees went out on strike. Question in dispute is company's refusal to sign a contract presented by union leaders.

Died within last month: W. C. Procter, Procter & Gamble; John C. Robinson, Merck; E. V. Benjamin, Bay Chemical, and D. E. Reid, Eastman.

I. G. Farbenindustrie declares a 7% dividend, unchanged from the preceding year. Net profit increased 4½% in 1933 over 1932.

Southern Chemical Corp. is formed by Cyanamid and Pittsburgh Plate Glass. The new firm will produce a varied line of products in connection with the alkali plant now being built at Corpus Christi by Southern Alkali.

THIRTY YEARS AGO

(From Our Files of May, 1919)

Chemical Alliance recommends \$15,000,000 chemical export corporation to simplify the problem of finding foreign markets for American products.

Annual dye exports are now valued at \$10,000,000.

Wall Street proposes combining into one corporation the Barrett Company, General Chemical, Semet-Solvay, and National Aniline. It is rumored that the action is probably the result of foreign competition.

The International Chemical Alliance—replacing the old International Chemical Society—is formed by the Allies in Paris as a means of combating German competition.

sult the library, of course, in the venerable and respected women's college of that town. We had trouble remembering whether Haverford came before or after Ardmore, and where Wynnewood was in relation to Narberth until an old inhabitant taught us, "Old maids never wed and have babies," for Overbrook, Merion, Narberth, Wynnewood, Ardmore, Haverford and Bryn Mawr.



THE THOUGHT OF MNEMONICS and the mysterious processes of the human brain remind us of another disquieting cloud that is floating towards us from the distant horizon. We refer to cybernetics, this business of replacing good ol' gray matter with an arrangement of electronic tubes. Reducing this trend to its final absurdity, we can someday expect one master-mind (who is necessary, of course, to design the machines) to do all the thinking for the universe. The rest of us will be merely hewers of plastic and drawers of glass bulbs.



THE PROCESS HAS GONE SO FAR in the writing field that a new book, its publisher tells us, bids fair to replace the architect of words, the craftsman of noble thoughts, the artist who paints with syllables and commas—i.e., the writer. "For example," says the publisher's brochure, "analyze the bare sentence, 'She was troubled by her memories.' By looking up the key-words . . . you can contrive innumerable sentences, rich in variety, but all improved variations on your original thought. *White-lipped memories haunted her heart, ghostlike and withered. Her heart ached with the lingering pain of stirred and dusty memories. Memories surged, weary and comfortless, through her darkened heart.*"

Wonder what that book could do with a survey of distillation equipment?



WE WERE VIEWING WITH ALARM a couple of paragraphs back the Juggernaut progress of machine over mind. We're happy to report, as a ray of hope, the fact that a man with a pair of bloodhounds can ferret out gas leaks in underground mains better than a crew of scientists with an infernal machine.



SAYS A U. S. STEEL research director, reviewing the metals picture: "It is . . . possible that in the future someone may rediscover the fact that gold is useful as a monetary standard."



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TYPICAL ANALYSIS

Color	— Dark
Melting Point (R & B)	— 80 C
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Saponification Number	— 140
Unsaponifiable Matter	— 20%
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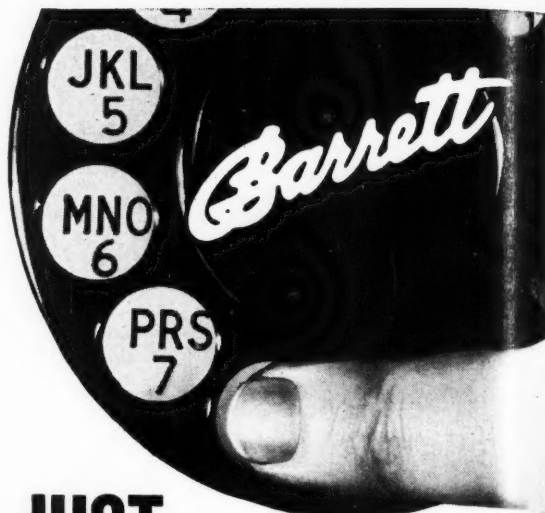
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† Philadelphia Jefferson 3-3000
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Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

Requests for further information or photostated copies of Canadian patents should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada

U. S. Patents from Official Gazette—Vol. 619, Nos. 2, 3, 4; Vol. 620, Nos. 1, 2 (Feb. 8-Mar. 8)
Canadian Patents Granted and Published Feb. 8-Mar. 15

*Petroleum

Separating isoprene and transpierylene from a debutanized refinery cracked stock by extractive and azeotropic distillation. No. 2,459,403. George L. Ahrens (to Standard Oil Development Co.).

Refining mineral oils and mineral oil products with concentrated sulphuric acid. No. 2,459,419. Bruno Kuno Engel and Fredrik Teodor Emanuel Palmqvist (to Aktiebolaget Separator-Nobel).

Removing fluorine compound as hydrogen fluoride from a mixture of reaction products comprising unconverted reactant, higher boiling reaction product and fluorine compound, by fractionally distilling said mixture to separate hydrogen fluoride from the unconverted reactant and higher boiling reaction product. No. 2,459,434. Elmer R. Kanhofer (to Universal Oil Products Co.).

Synthesizing hydrocarbons and oxygenated hydrocarbons from a gaseous feed containing carbon monoxide and hydrogen by forcing a mixture of carbon monoxide and hydrogen into a reaction zone containing a bed of fluidized iron catalyst. No. 2,459,444. Thomas C. Main (to Standard Oil Development Co.).

Catalytically dehydrogenating a normal mono-olefin having more than 3 carbon atoms in the molecule to the corresponding diolefin in the presence of a dehydrogenating catalyst consisting of a major amount of magnesium oxide, a small amount of iron oxide, and a small amount of potassium oxide. No. 2,459,449. Eugene H. Oliver and Charles F. Van Berg (to Standard Oil Development Co.).

Catalytically dehydrogenating a normal mono-olefin having more than 3 carbon atoms in the molecule to the corresponding diolefin in the presence of a dehydrogenating catalyst consisting of a major amount of magnesium oxide, a small amount of iron oxide, and a small amount of potassium oxide. No. 2,459,449. Eugene H. Oliver and Charles F. Van Berg (to Standard Oil Development Co.).

Butadiene extraction. No. 2,459,451. John W. Packie and Edwin M. Glazier (to Standard Oil Development Co.).

Two-stage hydrogenation process which comprises feeding a hydrogen-containing gas and a gas oil containing aromatics, sulfur and nitrogen, containing a sulfative catalyst selected from the group consisting of the sulfides of metals of groups VI and VIII of the periodic system and mixtures of such sulfides. No. 2,459,465. Warren M. Smith (to Standard Oil Development Co.).

Conditioning a catalyst for use in hydroforming of naphthas. No. 2,459,480. Albert W. Cely, Jr., and Clinton H. Holder (to Standard Oil Development Co.).

Continuous alkylation apparatus. No. 2,459,636. William N. Fenney (to Texas Co.).

Alkylation in the presence of a double fluoride catalyst. No. 2,459,775. Herbert J. Passino (to M. W. Kellogg Co.).

Synthetic lubricant consisting of a product of the polymerization of material having the structure, $\text{ROOC}-\text{CH}=\text{CH}-\text{COOR}'$, where R and R' are straight chain alkyl groups, having not more than 10 carbon atoms each, and where the average chain length of the said groups in the unpolymerized material is from 3 to 10 carbon atoms. No. 2,460,035. Dilworth T. Rogers and Jeffrey H. Bartlett (to Standard Oil Development Co.).

Purifying aldehyde contaminated hydrocarbons by bringing the contaminated hydrocarbons into contact with a compound selected from the class consisting of ammonia and water-soluble amines and thereafter separating the hydrocarbons from said aqueous solution. No. 2,460,056. Howard L. Yowell and Miller W. Swaney (to Standard Oil Development Co.).

Cracking hydrocarbon oils to hydrocarbons within the gasoline boiling range in the presence of ethyl hypochlorite. No. 2,460,200. Carlisle M. Thacker and Hillis O. Folkins (to Pure Oil Co.).

High-temperature hydrocarbon conversion process. No. 2,460,219. Sylvander C. Eastwood (to Socony-Vacuum Oil Co., Inc.).

Removing elemental sulfur from gasoline by contacting with an aqueous solution containing sodium hydroxide, sodium sulfide and thiocresols. No. 2,460,227. James Andrew Hart, Louis Nicholas Hollis and John Wilson Randolph (to Socony-Vacuum Oil Co., Inc.).

Lubricant comprising an oil of lubricating viscosity and an oil-soluble halogen-containing organic phosphorus compound having the general formula $\text{R}-\text{N}:\text{P}(\text{Q})_3$ where R is an organic radical containing a benzenoid ring structure; N is trivalent nitrogen; Q is a halogen radical and n is a small whole number selected from the numerical group consisting of the numbers 1 and 3. No. 2,460,301. Bert H. Lincoln and Gordon D. Byrkit (to Lubrizol Development Corp.).

Producing motor fuel which comprises cracking propane to produce a mixture of ethylene, propylene and unreacted propane, separating the ethylene, converting the separated ethylene substantially to a mixture of alpha and beta butylenes, substantially isomerizing the alpha butylene content to beta butylene and alkylating an isoparaffin. No. 2,460,303. Sumner H. McAllister, John Anderson and Walter H. Peterson (to Shell Development Co.).

Catalytic conversion of hydrocarbons. No. 2,460,404. John W. Ward (to Universal Oil Products Co.).

Noncatalytic cracking of a hydrocarbon oil. No. 2,460,463. John W. Loy (to Phillips Petroleum Co.).

Converting a gas mixture containing hydrogen and carbon monoxide into hydrocarbons. No. 2,460,508. Everett A. Johnson and Sam B. Becker (to Standard Oil Co.).

Process of alkylation in the presence of water as catalyst. No. 2,460,719. William A. Stover (to Socony-Vacuum Oil Co.).

Canadian

Extreme pressure lubricant comprising a mineral lubricating oil and the reaction product of sulphur monochloride with an aliphatic nitrile. No. 453,795. Anderson W. Ralston (to Armour and Co.).

Extreme-pressure lubricant comprising a lubricant having dispersed therein a thio-ether comprising two aromatic radicals at least one of which aromatic radicals contain an ester substituent. No. 453,915. Elliott Alfred Evans (to C. C. Wakefield & Co., Ltd.).

Desulphurization of hydrocarbon oil by contacting with a desulphurizing catalyst to dissociate the sulphur compounds. No. 453,973. R. D. Bent and C. A. Pines (Atlantic Ref. Co.).

Producing a surface tension reducing agent by subjecting an alkylated benzene containing at least two isopropyl radicals to the action of a sulphoning agent under conditions such that a sulphonic acid radical is introduced into the alkylated benzene. No. 453,974. J. A. Nevison (Atlantic Ref. Co.).

Process for conducting catalytic reactions in which the exothermic heat of reaction is removed by the recirculation of a relatively large volume of the reacting gas mixture. No. 454,039. F. T. Barr (to Standard Oil Development Co.).

Diesel fuel containing a high molecular weight organic acidic material obtained from petroleum fractions by caustic treatment. No. 454,051. B. T. Anderson and M. T. Flaxman (to Union Oil Co. of Calif.).

In a process for reconditioning an aqueous alkali metal hydroxide solution containing a solubility promoter for mercaptans and accumulated resinous emulsifiers, the steps comprising contacting said solution with a small amount of a solid adsorbent comprising magnesium oxide, under conditions to entrain the resinous emulsifier with the adsorbent, and separating said adsorbent containing entrained emulsifier from said solution. No. 454,228. Alan C. Nixon and Orris L. Davis (to Shell Development Co.).

Regenerating an aqueous alkali metal hydroxide solution containing a solubility promoter for mercaptans and accumulated resinous emulsifier, neutralizing said solution with CO_2 to produce a carbonated liquid and re-causticizing at least a portion of the carbonated liquid. No. 454,229. Rulon Wells McOmie and Orris L. Davis and Alan C. Nixon (to Shell Development Co.).

Monomeric butadiene stabilized with about 0.1% by weight of methyl salicylate. No. 454,231. Lewis F. Hatch, David E. Adelson and Billee O. Blackburn (to Shell Development Co.).

A treating solution consisting essentially of an aqueous solution of an alkali metal hydroxide, containing dissolved solubility promoter for mercaptans, and a small amount of a water-soluble surface active alkali metal salt of an alkyl naphthene sulfonic acid. No. 454,234. Orris L. Davis and Alan C. Nixon (to Shell Development Co.).

Production of branched chain alkanes from normal alkanes by isomerization with a bed of solid aluminum halide and a bed of solid adsorptive medium of high available surface area adjacent thereto, flowing a feedstock comprised of a normal alkane and a small proportion of hydrogen halide downwardly. No. 454,281. Eric William Musther Fawcett and Gwilyn Islwyn Jenkins (to Anglo-Iranian Oil Co., Ltd.).

Promoting thermal cracking of hydrocarbons by subjecting said hydrocarbons to cracking temperature in the presence of a small amount of nitroglycerin. No. 454,323. Carlisle M. Thacker and Hillis O. Folkins (to Pure Oil Co.).

Preventing corrosion of ferrous metals when contacted with hydrocarbons of relatively high hydrogen sulfide content. No. 454,417. Johannes N. Jacobus Perquin (to Shell Development Co.).

Refining of lubricating oils by contacting with a slurry of aluminum chloride and antimony trichloride. No. 454,418. Robert G. Larsen and Forrest J. Watson (to Shell Development Co.).

*Photographic

Photographic developer antioxidants selected from the class consisting of cyclohexanone-bisulfite, methyl cyclohexanone-bisulfites, mixtures of cyclohexanone and a soluble sulfite, and mixtures of cyclohexanone and a soluble bisulfite. No. 2,458,376. R. W. Henn (to Eastman Kodak Co.).

Fog inhibitor for photographic emulsions containing a compound having the structure, $\text{R}_2\text{R}_3\text{X}_4$ where X is a halogen atom and R is of the group consisting of hydrogen, ammonium and alkali metals. No. 2,458,442. R. E. Stauffer and W. F. Smith (to Eastman Kodak Co.).

Photographic process for converting black and white or monochrome pictures into multicolor pictures. No. 2,458,905. Harold C. Harsh, Richard M. Haff and Frank J. Kaszuba (to General Aniline & Film Corp.).

Dry developing negative which comprises subjecting a base having a coating comprising mercuric chloride, ammonium oxalate and ferric oxalate to light from an image to be reproduced, then exposing said composition to ammonia. No. 2,459,136. Sam Charles Slifkin (to General Aniline & Film Corp.).

Canadian

Increasing the stability of a diazotype light-sensitive layer containing a suitable diazo compound which comprises adding a member of the class consisting of sulphonated orthohydroxy-carboxylic acids of the

* U. S. Patents from Vol. 618, Nos. 1, 2, 3, 4. Vol. 619, No. 1. Canadian from Jan. 4-Feb. 1.

May.

metal hydroxide solution. No. 454,292. Ray Clyde Houtz (to Canadian Industries, Ltd.).
 Treating vinyl chloride-containing polymers subject to thermal decomposition under heat processing conditions by admixing N-chlorohydantoin. No. 454,293. Charles Graef Kamin (to E. I. du Pont de Nemours & Co.).
 Hard, infusible, insoluble polymer of mixed ester of polymeric methacrylic acid, a saturated aliphatic monohydric alcohol and allyl alcohol. No. 454,321. Maxwell Aaron Pollack and Albert G. Chenecek (to Pittsburgh Plate Glass Co.).
 Laminated article having a thick outer layer of resin which comprises a solid polymer of diallyl phthalate. No. 454,328. Theodore W. Evans and Edward C. Shokal (to Shell Development Co.).
 Preparing a powdery, water-soluble amorphous melamine-formaldehyde reaction product by reacting melamine with an aqueous solution of formaldehyde, spray drying and cooling. No. 454,407. Harold W. Mohrman and Francis E. Reese (to Monsanto Chemical Co.).

Processes and Methods

Converting a heavy, high boiling hydrocarbon oil into high quality gasoline by catalytic cracking. No. 2,458,109. T. P. Simpson (to Socony-Vacuum Oil Co.).
 Method and apparatus for burning contaminants from a moving bed contact mass. No. 2,458,356. L. P. Evans (to Socony-Vacuum Oil Co.).
 Method and apparatus for conducting reactions in the presence of a contact mass. No. 2,458,357. L. P. Evans (to Socony-Vacuum Oil Co.).
 Process of regenerating a moving bed of solid catalyst. No. 2,458,358. L. P. Evans (to Socony-Vacuum Oil Co.).
 Process of multiple-zone regeneration of a moving bed catalyst. No. 2,458,359. L. P. Evans (to Socony-Vacuum Oil Co.).
 Method for contacting gases with a solid contact material. No. 2,458,411. J. W. Payne (to Socony-Vacuum Oil Co.).
 Apparatus for contacting gases with a solid material. No. 2,458,412. J. W. Payne (to Socony-Vacuum Oil Co.).
 Method for contact material regeneration. No. 2,458,433. T. P. Simpson (to Socony-Vacuum Oil Co.).
 Method and apparatus for regenerating moving bed particle from contact mass materials. No. 2,458,434. T. P. Simpson (to Socony-Vacuum Oil Co.).
 Method and apparatus for regenerating a moving bed contact material. No. 2,458,435. T. P. Simpson (to Socony-Vacuum Oil Co.).
 Continuous emulsion polymerization of a conjugated diolefin and a vinyl monomer copolymerizable therewith. No. 2,458,456. I. L. Wolk (to Phillips Petroleum Co.).
 Method and apparatus for conducting the regeneration of a moving bed catalyst. No. 2,458,487. J. A. Crowley, Jr. (to Socony-Vacuum Oil Co.).
 Preserving the effectiveness of a metal cleaning molten alkali salt bath wherein an excess of alkali salt carbonate is formed by removal of the carbonate as by precipitating it out of the bath. No. 2,458,662. Hugh G. Webster.
 Preventing secondary reactions in catalytic processes in the presence of finely divided catalytic material. No. 2,458,862. Robert W. Krebs (to Standard Oil Development Co.).
 Removing entrained gaseous fluids from solids. No. 2,458,866. Homer Z. Martin (to Standard Oil Development Co.).

Concentration of salts having minimum solubilities at temperatures above those of the initial solutions. No. 2,459,302. David Aronson (to American Viscose Corp.).
 Method and apparatus for controlling multicomponent separation process in accordance with light absorption characteristics. No. 2,459,404. James A. Anderson, Jr. (to Standard Oil Development Co.).
 Cyclic process for separating an unsaturate non-aromatic hydrocarbon from a hydrocarbon mixture which comprises treating said mixture in liquid phase with silica gel to preferentially adsorb said unsaturate hydrocarbon therefrom. No. 2,459,442. Moses Robert Lipkin (to Sun Oil Co.).
 Detoxifying a waste cyanide liquor which comprises adjusting the composition to give it a pH of from 5-8 and ensure the presence therein of ammonium ion in concentration greater than is chemically equivalent to its cyanide content and subjecting the liquor to oxidizing conditions with formation of ammonia and carbon dioxide. No. 2,459,464. Allen S. Smith (to Blaw-Knox Co.).
 Catalytic conversion process wherein a moving powdered porous catalyst prepared from a silica hydrogel activated with minor amounts of alumina is utilized. No. 2,459,474. John D. Upham (to Phillips Petroleum Co.).
 Controlling reaction temperatures by carrying out the reaction in indirect heat exchange relationship with a relatively large body of finely divided solid material. No. 2,459,836. Eger V. Murphree (to Standard Oil Development Co.).
 Method of conducting a reaction between fluid reactants which comprises passing said reactants concurrently through a unitary mass of porous carbon bonded by carbon to and within and filling the cross section of an impervious tube. No. 2,460,907. Nathaniel M. Winslow and George W. Heise (to National Carbon Co., Inc.).
 Method and apparatus for counter-current contacting of liquids. No. 2,460,019. John D. Long and Cyril O. Rhys, Jr. (to Standard Oil Development Co.).

Canadian

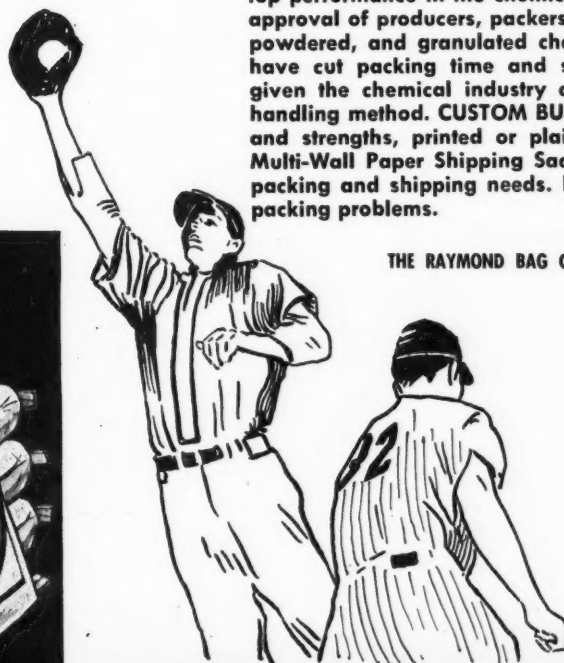
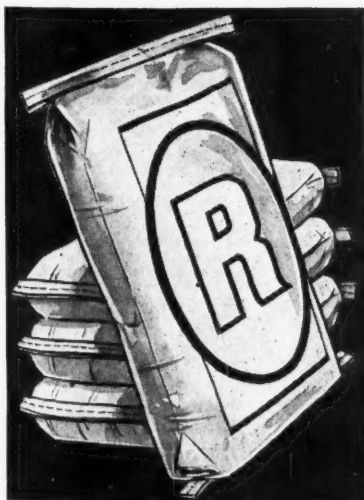
Method and apparatus for conducting catalytic chemical reactions. No. 454,038. C. E. Hemminger (to Standard Oil Development Co.).
 Controlling reaction temperatures by carrying out the reaction in indirect heat exchange relationship with a relatively large body of finely divided solid material. No. 454,041. E. V. Murphree (to Standard Oil Development Co.).
 Conducting an endothermic chemical reaction in the presence of a solid catalyst powdered condition. No. 454,042. B. E. Roethlis (to Standard Oil Development Co.).
 Controlling temperature in a mass of fluidized powdered catalyst material suspended in a gas which comprises continuously adding a cooled powdered inert material of substantially lower specific gravity and smaller particle size than the said catalytic material, to the fluidized mass. No. 454,044. S. B. Sweetser and L. B. Smith (to Standard Oil Development Co.).
 Dehydrating water-containing acetone comprising fractionating water-containing acetone in a first fractionating zone, separating a vapor fraction comprising acetone containing water in a quantity less than

* U. S. Patents from Vol. 618, Nos. 1, 2, 3, 4. Vol. 619, No. 1. Canadian from Jan. 4-Feb. 1.

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about 1 per cent from a liquid fraction predominating in water in the first fractionating zone, passing at least a part of the vapor fraction from the first fractionating zone into a second fractionating zone. No. 454,222. Clarence L. Dunn and Gino Pierotti (to Shell Development Co.).

Liquid purifier having cation exchanger communicating selectively with anion exchange. No. 454,291. Babooibhai Vrajilal Bhoota (to Dorr Co.).

*Rubber

Production of sylvan by passing hydrogen through furfural to substantially saturate the hydrogen with furfural and passage of the furfural-laden hydrogen over a reduced copper hydroxide catalyst. I. B. Johns (to Iowa State College Research Found.).

Thiol ester modification of synthetic rubbers. No. 2,458,432. W. H. Sharkey (E. I. du Pont de Nemours & Co.).

Rubber composition containing a 5-pyrazolone. No. 2,458,780. Louis H. Howland (to U. S. Rubber Co.).

Rubber softened with sulfur dioxide and chlorine treated polyisobutylene reacted with ammonia. No. 2,458,841. Norman M. Elmore and Albert M. Gessler (to Standard Oil Development Co.).

Preparing a synthetic rubber by polymerizing in an aqueous emulsion a mixture of an acrylonitrile with a cracked petroleum fraction containing butadiene and olefins of 3-5 carbon atoms. No. 2,459,126. Albert M. Clifford (to Wingfoot Corp.).

Producing polymerization products which comprises preparing a mixture consisting of a mono-isolefin and an unsaturated aliphatic alcohol ester of an alpha beta olefin dicarboxylic acid, the alcohol being selected from the group consisting of allyl, methylallyl, crotyl, butenyl, propargyl and butynyl alcohols and subjecting said mixture while liquid to the action of a Friedel-Crafts catalyst to form a soft, elastic and rubbery product. No. 2,459,501. John Melvin Coon and John B. Rust.

Elastomeric copolymer mixed with phenol-aldehyde resin. No. 2,459,739. Frank J. Groten and Robert J. Reid (to Firestone Tire & Rubber Co.).

Making synthetic rubber having improved processing characteristics and adapted to form vulcanizates having increased blowout resistance, which includes mixing a soluble aluminum salt with an aqueous dispersion of a synthetic rubber. No. 2,459,740. Robert L. Bebb (to Firestone Tire & Rubber Co.).

Metal bonds by means of chlorinated rubber adhesives containing a polyalkylene polyamine. No. 2,459,742. Harry P. Bradley and John L. Dum (to Firestone Tire & Rubber Co.).

Continuous method of coagulating a rubbery butadiene-styrene copolymer latex introducing beneath the surface of a body of liquor coagulant for the latex consisting essentially of a water solution containing $Al_2(SO_4)_3 \cdot 18H_2O$. No. 2,459,748. Charles Robert Johnson (to Firestone Tire & Rubber Co.).

Butadiene-styrene copolymer tackified with oxidized polymer. No. 2,459,761. Henry F. Palmer (to Firestone Tire & Rubber Co.).

Vulcanizing a substance of the group consisting of natural rubber, reclaimed rubber and synthetic rubbery conjugated diolefin polymers by heating the substance and sulfur in the presence of a thiazole accelerator and an activator of the class consisting of cyclohexylammonium and dicyclohexylammonium salts of a cresol. No. 2,459,763. Mark M. Heywood (to Firestone Tire & Rubber Co.).

Butadiene-styrene copolymer having uniformly admixed therein magnesium nitride particles coated with a plasticizer for synthetic rubber. No. 2,459,916. Alva C. Byrns and Gerald von Stroh (to Permanente Metals Corp.).

Producing synthetic rubber-like polymerizates by polymerizing a mixture of a butadiene-1,3 hydrocarbon and a minor proportion of another unsaturated organic compound copolymerizable therewith in aqueous emulsion, using a water soluble soap emulsifier, a hydrocarbon soluble peroxide, an alkali persulfate, a mercapto polymerization modifier having 8-18 carbon atoms per molecule, a polyolefinic, higher fatty acid in the free state. No. 2,460,038. George E. Serniuk (to Standard Oil Development Co.).

Rubber-like conjugated dienehydrocarbon-vinyl copolymer selected from the class consisting of 1,3-butadiene-styrene, and 1,3-butadiene-acrylonitrile copolymers containing thioacetamide. No. 2,460,177. Louis H. Howland (to U. S. Rubber Co.).

Vulcanizing a sulfur-vulcanizable rubber by incorporating sulfur, a small amount of a primary organic rubber-vulcanization accelerator, and an activator having the general formula $Ar-S-NH-R$ where Ar represents a carbocyclic ring having a nuclear carbon atom directly bonded to the S, and which nucleus is further substituted by a group more electro-negative than hydrogen selected from the class consisting of halogen, nitro, acyl, carboxyl, carboxy ester, sulfonamide, and acylamide, and R is a member selected from the group consisting of aliphatic and aromatic hydrocarbon groups. No. 2,460,393. Philip T. Paul (to U. S. Rubber Co.).

Plastic unvulcanized synthetic rubber comprising a copolymer of butadiene and styrene and triethanolamine. No. 2,460,600. Donald V. Sarbach (to B. F. Goodrich Co.).

Creatine and creatine as catalysts for polymerization of butadiene. No. 2,460,606. William D. Stewart (to B. F. Goodrich Co.).

Making rubbery polymeric organo-siloxane compositions by mixing a liquid polymeric siloxane with benzoyl peroxide. No. 2,460,795. Earl Leathen Warrick (to Corning Glass Works).

Canada

Accelerating the cure of polychloroprene by incorporating a 3,3,3',3'-tetraalkyl-1,1'-spirobisindane-5,5',6',6'-tetrol. No. 453,831. Byron Walter Bender (to Dominion Rubber Co., Ltd.).

Tacky unvulcanized synthetic rubber containing natural rubber, a copolymer of butadiene styrene and a viscous tacky unvulcanized oxidized natural rubber. No. 453,841. Alfred Theadusz Gosienicki (to The Firestone Tire & Rubber Co.).

Magnesium-sulphate coagulum of zinc oxide and rubber-like copolymer of butadiene and styrene. No. 453,842. William E. Kaswell and Joseph R. Laman (to The Firestone Tire & Rubber Co.).

Dimethyl silicone elastomers containing lead monoxide. No. 453,991. J. Marsden and G. F. Roedel (Canadian General Electric Co., Ltd.).

Rubber hydrochloride composition containing a C-alkyl substituted piperazine. No. 454,390. James Paul Chittum and George Egbert Hulise, Jr. (to Dominion Rubber Co., Ltd.).

Electrically conductive rubber by mixing a rubber gum stock and vulcanizing agents, adding a volatile liquid solvent and mixing conductive carbon black and more liquid solvent. No. 454,436. Francis Alexander Koehler (to Wingfoot Corp.).

*Specialties

Grease composition comprising a mineral lubricating oil, the complex reaction product of an oil-soluble metal salt of sulfonic acid and a salt of an acid selected from the group consisting of low molecular weight

aliphatic carboxylic acids, in which at least one cation in the above salts is polyvalent. No. 2,458,082. John C. Zimmer and Gordon W. Duncan (to Standard Oil Development Co.).

Waterproofing composition which comprises an alkaline aqueous solution of a soluble soap, and a soluble double carbonate of a zirconium salt and an alkali metal carbonate. No. 2,457,853. H. L. Van Mater (National Lead Co.).

Mineral castor oil comprising hydrocarbon oil, an aluminum soap, a polyhydric alcohol and a metal soap of preferentially oil-soluble sulfonic acid. No. 2,458,034. R. A. Swenson and A. W. Weitkamp (to Standard Oil Co.).

Soldering flux consisting of zinc chloride, ammonium chloride, stannic chloride, cadmium chloride, lead chloride, methyl salicylate and water. No. 2,458,232. A. L. Wells.

Oil composition consisting of a mineral oil and an oil-soluble polyvalent metal salt of an alkenyl-succinic acid monoamide in which the alkenyl group contains from 5 to 18 carbon atoms. No. 2,458,425. A. G. Rocchini (to Gulf Research & Development Co.).

Froth flotation of sulfide ores in the presence of a n-dichlorothiocabarilide. No. 2,458,523. Rhetherford B. Martin (to Kennecott Copper Corp.).

Mineral oil composition. No. 2,458,526. Edward A. Oberright (to Socony-Vacuum Oil Co., Inc.).

Improved mineral oil containing a material selected from the group consisting of an oil-soluble, nitrogen-containing condensation product and a polyvalent metal salt of said condensation product; said product being obtained by reaction of an aldehyde, a hydroxy-aromatic carboxylic acid and a polyamine. No. 2,458,527. Edward A. Oberright (to Socony-Vacuum Oil Co., Inc.).

Petroleum distillate carrying a hydrogenated bacterial extract to exhibit antioxidant properties for the distillate. No. 2,458,535. Sol Shapirino. Carnivorous fish repellent composition consisting of copper acetate, a highly water-soluble dark colored dye and a water-soluble wax binder. No. 2,458,540. Richard L. Tuve, John M. Fogelberg, Frederick E. Brinnick and Horace Stewart Springer.

Two step non-electrolytic process for cleaning the surfaces of alkali resistant metals by immersing the metal in a bath comprising a molten mixture of alkali metal nitrate and alkali metal hydroxide, and alkali metal chloride. No. 2,458,661. Hugh G. Webster and Clarence L. Falter (to J. H. Shoemaker).

Removing objectionable sodium ferrite from a molten alkali-salt bath comprising molten alkali salts, molten sodium hydroxide and said objectionable sodium ferrite comprising passing steam into said bath to precipitate the ferrite. No. 2,458,663. Hugh G. Webster (to J. H. Shoemaker).

Solution of sulphur in ethylene-diamine. No. 2,458,764. Henri Brunel. Vulcanized rubber articles reinforced with cellulosic products, said rubber articles and cellulosic products being bonded together by chemical reaction at their boundary surfaces with a compound of the class consisting of dimethylol derivatives of mono-substituted phenol, monomethylol derivatives of double substituted phenol and their salts. No. 2,458,886. Johannes G. Weeldenda (to American Enka Corp.).

Manufacturing adhesive alkyl ethers of a gelatinizable carbohydrate soluble in water to form a paste by mixing the carbohydrate with an alkaline solution and an etherifying agent. No. 2,459,108. Jan Lolkema (to Attorney General of the U. S.).

Mineral oil containing a reaction product of an aldehyde, a hydroxy-aromatic compound and a polyamine in which each amino group has at least one hydrogen atom. No. 2,459,112. Edward A. Oberright (to Socony-Vacuum Oil Co., Inc.).

Mineral oil containing an oil-soluble, phosphorus-containing reaction product obtained by reacting an aldehyde with a hydroxyaromatic compound. No. 2,459,113. Edward A. Oberright (to Socony-Vacuum Oil Co., Inc.).

Mineral oil containing an oil-soluble, sulfur-containing reaction product obtained by reacting an aldehyde, a hydroxyaromatic compound and a polyamine. No. 2,459,114. Edward A. Oberright (to Socony-Vacuum Oil Co., Inc.).

Mineral oil comprising an oil-soluble, phosphorus-containing reaction product obtained by reacting a phosphorus compound selected from the group consisting of a phosphorus halide, a phosphorus thiohalide and a phosphorus sulfide, with a condensation product. No. 2,459,115. Edward A. Oberright (to Socony-Vacuum Oil Co., Inc.).

Mineral oil containing an oil-soluble, sulfur-containing reaction product. No. 2,459,116. Edward A. Oberright (to Socony-Vacuum Oil Co., Inc.).

Concentration of nonsulfide, nonsilicate ores with nitric acid treated fatty acids. No. 2,459,219. James B. Duke (to Minerals Separation North American Corp.).

Composition comprising a major amount of a mineral oil, a minor amount of an alkyl dibasic aliphatic acid of at least 16 carbon atoms and a sulfurized unsaturated fatty acid having at least 8 carbon atoms. No. 2,459,717. George L. Perry (to Shell Development Co.).

Mineral lubricating oil having incorporated therewith sulfurized oleic acid. No. 2,459,718. Emmett R. Barnum and George L. Perry (to Shell Development Co.).

Pressure sensitive adhesive mass of a mixture of a partially cured, rubbery butadiene-styrene copolymer, polyisobutylene; tackifying resin; a plasticizer composed of a major amount of low molecular weight, high viscosity liquid polyisobutylene and a minor amount of a high viscosity mineral oil; and a filler. No. 2,459,891. William L. Nelson and Otto R. Sinnig (to Johnson & Johnson).

Polyvinyl acetate emulsion adhesive. No. 2,459,995. George Osman Morrison, Thomas Patton Gladstone Shaw, Joseph Donal Paul-Emile Mercier and Henry Michael Collins (to Shawinigan Chemicals, Ltd.).

Hydrocarbon material susceptible to deterioration by oxidation containing a small quantity sufficient to stabilize against such oxidation, a compound of the formula, $R_2Ar(XM)S_2(MX)ArR_2$, in which Ar is an aromatic hydrocarbon nucleus, R is a branched chain aliphatic hydrocarbon radical containing 14-24 carbon atoms, X is a nonmetallic element of group VI of the periodic table, M is a hydrogen equivalent of a metal, S is sulfur, and α is an integer from 1 to 4. No. 2,460,025. John G. McNab and Jeffrey H. Bartlett (to Standard Oil Development Co.).

Lubricant material having improved viscosity index and superior extreme pressure properties comprising a mineral oil base lubricating material having in solution therein a copolymer of butadiene and disubutylene; the said copolymer being treated with a phosphorus compound to incorporate therein phosphorus and sulfur. No. 2,460,041. William J. Sparks and David W. Young (to Standard Oil Development Co.).

Insulating and dielectric compositions consisting of liquid chlorinated aryl hydrocarbon and tin naphthenate dissolved in said hydrocarbon. No. 2,460,126. Frank M. Clark (to General Electric Co.).

*U. S. Patents from Vol. 618, Nos. 1, 2, 3, 4. Vol. 619, No. 1. Canadian from Jan. 4-Feb. 1.

Sealing material which comprises a layer of a mixture of a non-drying heat fusible and soluble alkyl resin which is a polyester of a polyhydric alcohol and a saturated dicarboxylic acid, zinc chromate, a water-resistant vinyl resin of a class consisting of vinyl acetal, vinyl chloride and a copolymer of vinyl chloride and vinyl acetate. No. 2,460,181. Wallace P. Marshall (to Pittsburgh Plate Glass Co.).

Benzoyl peroxide bleaching composition comprising benzoyl peroxide and dead-burnt anhydrous calcium sulfate. No. 2,460,439. Robert S. White-side and Chester E. Allen (to Winthrop-Stearns, Inc.).

Flux-coated welding electrodes in which the flux ingredients comprise an alkali metal compound and a manganese-aluminum alloy. No. 2,460,537. Ernest Clarence Rollason (to Metal and Thermid Corp.).

Spark plug thread lubricant comprising a solid lubricant consisting of graphite, an oil soluble hydroxy heterocyclic amine and a naphthenic-base lubricating oil. No. 2,460,632. Bert Folda, Jr. (to Socony-Vacuum Oil Co., Inc.).

Laundry souring composition consisting of ammonium silico-fluoride and magnesium silico-fluoride. No. 2,460,680. Albert L. Courtney and Clifton E. Smith (to Wyandotte Chemical Corp.).

Canadian

A synthetic wax comprising a mixed ester and hydroxyamide of a self-ester of omega-hydroxydecanoic acid and hexadecylamine. No. 453,790. Theodore F. Bradley (to American Cyanamid Co.).

Emulsifier comprising the mixture of lipophilic partial ester of a long chain fatty acid and hydrophilic polyhydroxylic organic compound, and highly hydrophilic hydroxy-polyoxyethylene ether of lipophilic partial ester of a long chain fatty acid and hydrophilic polyhydroxylic organic compound. No. 453,796. William C. Griffin (to Atlas Powder Co.).

Impression material comprising a water-soluble alginate, gel-precipitant thereof consisting of calcium oxide and magnesium carbonate. No. 453,825. Vance V. Vallandigham (to Coe Labs., Inc.).

Dry impression material comprising a water-soluble alginate and a gel-forming agent consisting of calcium oxide. No. 453,826. Vance V. Vallandigham (to Coe Labs., Inc.).

Printing ink vehicle comprising a solvent, a binder comprising a resin selected from the group consisting of the coumarone and indene resins, dissolved in a resin modified drying oil comprising the esterification products of polyethers of pentaerythritol. No. 453,901. Isidore M. Bernstein (to H. I. Co., Inc.).

Fibrous materials of improved fire resistance owing to a content of a hydrohalide salt of an aliphatic polyamine containing less than 2 carbon atoms per nitrogen atom. No. 453,926. Alexander James Wesson and Henry Charles Olpin (to Camille Dreyfus).

Producing an antioxidant product from a soap stock obtained in the alkali refinement of vegetable oil by contacting with ethylene dichloride. No. 454,025. L. O. Buxton (to National Oil Prods. Co.).

Composition comprising a mineral oil containing a small amount of an emulsifying agent and a small amount of a vegetable wax. No. 454,037. J. C. Zimmer and G. M. McNulty (to Standard Oil Development Co.).

Lithographic plate protector comprising low viscosity methyl cellulose, dextrine, water and preservative. No. 454,048. H. Stockmayer (to General Printing Ink Corp.).

Alkali metal soap of a new composition of matter comprising an alkyl maleic acid, the alkyl radicals of which contain at least 12 carbon atoms, and the olefinic double bonds of which are at least partially saturated with an element selected from the group consisting of halogen and sulfur, said acid having a bromine number below 15. No. 454,223. Robert G. Larsen (to Shell Development Co.).

Lubricating oil comprising mineral lubricating oil containing dissolved oil-soluble polyvalent metal salt of an alpha amino acetic acid which is resistant to oxidation under normal lubricating conditions in internal combustion engines. No. 454,225. Ellis R. White (to Shell Development Co.).

Improved grease composition comprising mineral lubricating oil, a soap and admixed therewith a small amount of semicarbazone. No. 454,226. Ellis R. White (to Shell Development Co.).

Lubricating oil containing a sulfonate salt and one or both of the following: a sulfonized ester having at least 10 carbon atoms combining a monohydric alcohol with a monocarboxylic acid, and an amount of an anti-oxidant selected from the group consisting of aromatic amine and hydroxy anti-oxidants. No. 454,227. Roland F. Bergstrom (to Shell Development Co.).

Lubricating composition comprising mineral hydrocarbon oil and a pre-oxidized aromatic hydrocarbon mixture. No. 454,230. Robert G. Larsen and Frederic A. Armfield (to Shell Development Co.).

Scooping composition comprising an oil-in-water emulsion having as a disperse phase butoxyethyl stearate and as the continuous phase an aqueous solution of gelatin and sodium diisopropyl naphthalene sulfonate. No. 454,412. Saul Kaplan (to Richards Chemical Works).

Vehicle for a printing ink comprising resin, the original ingredients of which are polyhydric alcohol, phthalic acid anhydride and vegetable oil fatty acid. No. 454,424. Harvey A. Seil, William Walter Frankel, Harvey Cole and Jacob Logan Fox (to Synthetic Inks, Inc.).

Corrosion preventive composition comprising blown castor oil, an alcohol having not more than three carbon atoms per molecule, an alkaline earth ricinoleate, and at least one alkali metal ricinoleate. No. 454,429. George L. Doelling (to Wagner Electric Corp.).

Lubricant comprising a hydrocarbon oil and an aryl ester of phosphoric acid. No. 454,442. William M. Malisoff (to Canadian Industries, Ltd.).

*Textiles

Colored fluorescent cellulose acetate filamentary materials having a finely divided pigment of zinc sulfate fluorescent in a red color incorporated therein and colored fluorescent dyestuff consisting of the hydrochloride of diethyl-m-amino-phenol-phthalate. No. 2,457,808. R. G. Dort (to Celanese Corp.).

Colored fluorescent cellulose acetate filamentary materials by dyeing cellulose acetate textile material having incorporated therein a finely divided pigment consisting of zinc sulfate fluorescent in a red color with a dyebath comprising p-nitro-benzene-azo-4-methyl-2-di-hydroxy-ethyl-aminobenzene, water and sulfonated ricinoleic acid. No. 2,457,838. R. R. Sitzler and G. E. Dennison (to Celanese Corp.).

Chemical retting process of producing bast fibres from vegetable materials by immersing in hydrogen peroxide, ammonium phosphate and urea. No. 2,457,856. J. J. Zeisler (to Attorney General of U. S.).

Sizing Multifilament yarns of a linear polyester of a terephthalic acid and a glycol of the series $\text{HO}(\text{CH}_2)_n\text{OH}$ where n is an integer from 2 to 10 inclusive by impregnating said yarns with an aqueous solution of a partially hydrolyzed polyvinyl acetate and a water-soluble resin obtainable by the condensation of an alkylolurea with formaldehyde. No. 2,459,052. Richard James Smith (to Imperial Chemical Industries, Ltd.).

Removing shine from fabrics by applying a neutral aqueous solution of an organic fabric-softening wetting agent, said wetting agent being selected from the group consisting of sulfates and sulfonates of organic esters, organic alcohols, ethers and amines. No. 2,459,236. Ralph H. McKee.

Producing on organic fibers a relatively permanent deposit of yellow highly dispersed colloidal silver by reducing, in contact with the fibers on which the deposit is to be produced, an aqueous solution of a silver compound providing silver ions, by reacting said solution with sufficient of an alkylolamine to effect such reduction. No. 2,459,896. George Schwarz.

Aqueous alkaline solution of vegetable protein which is suitable for extrusion in the manufacture of threads and which contains as a stabilizing agent a cyanide from the group consisting of the alkali metal cyanides, the alkaline earth metal cyanides and ammonium cyanide. Alfred Frank Millidge and Claude Leonard Knight (to Courtaulds, Ltd.).

Manufacture of artificial protein filaments by wet-stretching an insolubilized filament contacting with formaldehyde. No. 2,460,372. Robin H. K. Thomson (to Imperial Chemical Industries, Ltd.).

Textile material comprising filaments consisting essentially of cellulose acetate and having incorporated therein as a plasticizer dichlorodiphenyl-trichloroethane and having incorporated therein dicyandiamide as a stabilizer. No. 2,460,377. Amerigo F. Caprio and William Horback (to Celanese Corp. of Amer.).

Canadian

Chlorinating wool by treatment in aqueous solution with formaldehyde and a chlorinating agent consisting of an acid aqueous solution of the reaction product of a member of the group consisting of sulphamic acid and salts of sulphamic acid with a member of the group consisting of the salts of hypochlorous acid. No. 453,789. Jonas Kamlet, Mark Weisberg and Leo Beer (to Alroese Chemical Co.).

Treating protein fibres in the absence of acid with a zinc salt. No. 453,828. Robert Louis Wormell (to Courtaulds, Limited).

Production of alginate threads by projecting an aqueous solution of alkali alginate into a bath containing a calcium salt. No. 453,829. Horace James Hegan (to Courtaulds, Limited).

Producing a fire resistant textile fabric by impregnating the fabric with a carbonate of an alkali metal, drying, impregnating with a solution of antimony trichloride and a solution of an organic compound of the group consisting of chlorinated paraffin, tricresyl phosphate, triphenyl phosphate, drying, passing through an alkali carbonated solution and washing to remove residual alkali carbonate. No. 454,375. Clarence Burns White.

Improving the crease-resisting properties of textile materials by impregnating the said textile materials with an aqueous solution containing a partially condensed resinous aldehyde and condensation product, ammonium thiocyanate and sodium hexametaphosphate and subjecting the treated materials to the action of heat to convert the partially condensed resinous aldehyde condensation product into an insoluble condensation product. No. 454,387. Cryden Meredith Whitaker (to Courtaulds, Ltd.).

Agricultural

Stabilizing DDT by heating an aqueous mixture containing molten α,α -di(p-chlorophenyl)- β,β,β -trichloroethane and a weakly basic compound. No. 2,461,852. Gustav A. Stein and Max Tishler (to Merck & Co., Inc.).

Producing hexaethyl tetraphosphate by reacting diethyl ether and phosphoric anhydride. No. 2,462,057. Howard Adler (to Victor Chemical Works).

Synthesizing pantothenic acid which comprises directly combining a lower alkyl ester of β -alanine with α -hydroxy- β,β -dimethyl- γ -butyrolactone. No. 2,462,449. Roger J. Williams (to Research Corp.).

Fungicide comprising 1-methoxy-4-chlorobutene-2. No. 2,462,830. Oliver W. Cass (to E. I. du Pont de Nemours & Co.).

Fly spray composition comprising a solution of pyrethrum and an amide of a primary amine and a dicarboxylic acid having an unsaturated aliphatic carbon chain of at least 2 and not more than 3 carbon atoms linking the carboxyl groups. No. 2,462,835. Harold W. Arnold and Norman E. Searle (to E. I. du Pont de Nemours & Co.).

Sesame extract synergized insecticides. No. 2,463,324. Wm. A. Simanton (to Gulf Research & Development Co.).

In producing DDT of improved quality comprising sulfonating, with sulfuric acid, at least a part of the ortho, para isomer present in a mixture comprising ortho, para and para, para isomers of DDT and separating the sulfonated material from the para, para isomer. No. 2,463,653. Michael Sveda (to E. I. du Pont de Nemours & Co.).

Cellulose

Bleaching of cellulosic matter by treating it with an aqueous hypochlorite containing water-soluble bromide. No. 2,461,105. Rudolf Bloch, Kurt Goldschmidt, Isaac Schnerb and Paul Goldschmidt.

Cellulose esters of amino acid. No. 2,461,152. Thos. S. Gardner (to Eastman Kodak Co.).

Production of highly stable organic acid esters of cellulose. No. 2,461,572. Robt. D. Rowley and Robt. F. Thompson (to Celanese Corp. of America).

Clarifying acid regenerating baths for repeated use in the preparation of cellulose articles from viscose, the step of floating impurities out of the bath in a froth formed in the presence of a betaine. No. 2,462,948. Jos. L. Costa and Wm. Harlow Kahler (to Woonsocket Rayon, Inc.).

Cellulose organic acid ester composition which fluoresces in ultra-violet light, comprising a cellulose ester selected from the group consisting of the cellulose simple esters and cellulose mixed esters of the fatty acids containing from 2-4 carbon atoms, and as a fluorescing agent, 2,2'-dihydroxy benzalazine. No. 2,464,128. Wm. M. Gearhart and Lester W. A. Meyer (to Eastman Kodak Co.).

Canadian

Producing celluloses by boiling with a chloride solution, and submitting the same to a strong sodic boiling treatment with a solution containing sodium chloride in addition to caustic soda. No. 455,222. Pierre Porphire (to Société Française de la Cellulose, Société Anonyme).

Ceramics

Refractory lining composition consisting of ganister, silica flour and bentonite. No. 2,461,146. Wm. C. Cress (to Whiting Corp.).

Canadian

Glass having a low power factor consisting of SiO_2 , PbO , K_2O , Na_2O , Li_2O . No. 454,480. William Houston Armistead (to Corning Glass Works).

Bluish glass which consists of SiO_2 , BaO , R_2O (alkali metal oxide) and Al_2O_3 . No. 454,481. William H. Armistead (to Corning Glass Works).

*U. S. Patents from Vol. 618, Nos. 1, 2, 3, 4. Vol. 619, No. 1. Canadian from Jan. 4-Feb. 1.

Coatings

- Coating composition for masonry surfaces comprising an aqueous solution of potassium silicate and composite pigment composed of silica, barium sulfate, titanium oxide and glycerine. No. 2,460,878. Charles Di Battista and Bernard Lewis Di Battista.
- Fluid leaping pigment paint consisting of leaping pigment and an emulsion with water as the internal phase and an organic water-insoluble, thermoplastic paint base as the external phase. No. 2,461,352. Vaughn R. Smith and Don E. Stevens (to Calif. Research Corp.).
- Coating composition comprising a suspension of a finely-divided emulsion-polymerized vinyl chloride polymer in a suspension media composed of a lower monoalkyl ether containing up to 6 carbon atoms in the alkyl radical of a glycol from the group consisting of ethylene and diethylene glycol and a liquid aromatic hydrocarbon, said suspension media being dissolved therein a copolymer including combined vinyl chloride and vinyl acetate. No. 2,461,613. Richard W. Quarles and Clayton I. Spessard (to Carbide and Carbon Chemicals Corp.).
- In treating ferrous, zinc and cadmium metal surfaces to provide corrosion resisting coatings, the steps comprising applying to the metal surface an aqueous solution consisting of ortho-disodium phosphate and zirconium present as a water-soluble compound. No. 2,462,196. Geo. W. Jernstedt (to Westinghouse Electric Corp.).
- Water-emulsifiable, air drying coating comprising the product obtained by the steps of breaking by hydrolyzation the anhydride linkage of reaction product of maleic anhydride and a modified alkyl resin resulting from the esterification of a polyhydroxy alcohol with a dicarboxylic acid in the presence of a fatty acid glyceride drying oil and a neutralizing with a mixture of alkali metal silicate and a water-soluble basic nitrogen compound of a class consisting of ammonia and a water-soluble amine. No. 2,462,618. Geo. E. Eilerman (to Pittsburgh Plate Glass Co.).
- Coating compositions comprising a resin plasticized with at least one member of the group consisting of biphenyl, ortho-terphenyl, and meta-terphenyl. No. 2,462,631. Lewis D. Gittings and Robt. H. Fundaburk (to Monsanto Chemical Co.).
- Producing a hard protective coating on a ferrous metal surface by applying a coating of a composition comprising finely divided metallic zinc incorporated in an aqueous solution of an alkali silicate, and converting the coating to a substantially insoluble condition by reacting carbon dioxide therewith. No. 2,462,763. Victor Charles John Nightingall, deceased, by Ruth Valencia Nightingall, Anbrey Mitchell Old, Charles Montefiore Gladstone Nightingall, James B. Aitken and Maxwell G. McKenzie (to Di-Met Proprietary Ltd.).
- Protein water paint vehicles having increased wet abrasion resistance. No. 2,462,811. James C. Konen and Burton W. Schroeder (to Archer-Daniels-Midland Co.).
- Insulating electrical equipment with a melamine aldehyde resin, a fatty acid ester alkyl resin and ethyl cellulose. No. 2,462,912. Howard E. Smith and Donald M. O'Halloran (to Centro Research Laboratories).
- Composition for coating material comprising a fatty oil and a fatty oil-soluble organic resin selected from the group consisting of natural resins, their salts, esters and oxidation products, phenol-aldehyde resins and coumarone resins. No. 2,463,023. Rupert S. Daniels and Wm. R. Catlow (to Bakelite Corp.).
- Coating solution for providing anti-static coatings comprising a partially hydrolyzed ethylene/vinyl acetate copolymer, an anti-static agent consisting of an alkyl pyridinium chloride having 8-18 carbon atoms in the alkyl radical and an aqueous solution of ethyl alcohol. No. 2,463,282. Bun Po Kang (to E. I. du Pont de Nemours & Co.).
- Accelerating phosphate coating with indigoid compounds. No. 2,463,496. Wm. S. Russell (to Parker Rust Proof Co.).
- Coating comprising a granulated cork, asbestos, talc, expanded vermiculite, limerock, magnesite, and flake magnesium chloride. No. 2,463,663. Albert I. Wand (to Mundet Cork Corp.).

Canadian

- Aluminum having a plastic adherent thereto the surface of said plastic having been treated with a solution of ferric chloride. No. 454,600. Wayne C. Norris and Frank R. Spencer (to American Cyanamid Co.).

Detergents and Surface Active Media

- Distillation of aqueous alcohol extracts of mahogany sulfonates. No. 2,461,371. Eldon B. Cole (to Sinclair Refining Co.).
- Cleaning composition comprising oxalic acid, a composite softening agent which consists of a partially sulfonated saturated aliphatic hydrocarbon having at least 16 carbon atoms. No. 2,462,341. Breckinridge Kenney Tremaine (to E. I. du Pont de Nemours & Co.).
- Solid detergent composition consisting of synthetic organic non-soap water-soluble detergent from the class consisting of sulphates and sulphonates and an organic builder to improve the foaming properties selected from the group consisting of the lower monohydric alcohol and glycol esters of higher fatty aliphatic acids. No. 2,462,758. John David Malkemus (to Colgate-Palmolive-Peet Co.).
- Non-irritative soap product containing the soaps of fatty acids having at least 12 carbon atoms and free of the soaps of fatty acids having less than 12 carbon atoms. No. 2,462,831. Emil E. Dreger and John Ross (to Colgate-Palmolive-Peet Co.).
- Reducing foaming in the boiling of an alkaline, aqueous solution of a long-chain alkyl surface-active agent by adding n-butyl trichlorosilane. No. 2,462,999. Robt. Blackburn Scott, Jr. (to E. I. du Pont de Nemours & Co.).
- A wetting agent comprising a mixture of mono and dialkyl aryl alkali metal sulfonates. No. 2,463,497. Robt. L. Smith, Duncan J. Crowley and Pharez G. Waldo (to Socony-Vacuum Oil Co. Inc.).
- Dust-free, homogeneous detergent by mixing dry solid sodium hydroxide and dry solid sodium carbonate. No. 2,463,680. Thos. E. Corrigan (to Wyandotte Chemicals Corp.).
- Substituted alkylene glycol esters of alginic acid useful as an emulsifying agent. No. 2,463,824. Arnold B. Steiner and Wm. H. McNeeley (to Kelco Co.).

Dyes and Pigments

- Production of colored fabrics exhibiting crepe effects by mechanically impregnating a fabric containing organic derivative of cellulose while being subjected to the action of a hot aqueous fluid with an aqueous alcoholic solution of a dyestuff. No. 2,460,875. Cyril M. Croft and Walter H. Hindle (to Celanese Corp. of America).
- Manufacturing a di-metho-sulfate of an azobenzene which comprises making a mixture of a di-alkyl sulfate having 1-4 carbons and a compound of the group consisting of the chloro derivative of di-(methylmercapto)-4,4'-di(6-methylthiazyl)-(2)-azobenzene. No. 2,460,932. Norman Hulton Haddock and Clifford Wood (to Imperial Chemical Industries Ltd.).
- Coloration of articles of polymerized diallyl phthalate by the action of a solution of a dye in a mixture of glycerol and water. No. 2,461,612. Henry Charles Olipin and Alexander James Wesson (to Celanese Corp.).
- Preparing an anhydrous triarylmethane dye by crystallizing a dehydrated

- dye material selected from the group consisting of crystal violet and mixtures of crystal violet with the zinc chloride double salt thereof, from a solvent selected from the group consisting of nitroparaffins having not more than 10 carbon atoms, nitrobenzene and its homologs having not more than 10 carbon atoms, and mixtures thereof. No. 2,461,896. Guy Scott Herrick (to American Cyanamid Co.).
- Stillbene bis triazole azo dyestuffs. No. 2,462,405. Ernst Keller and Reinhard Zweidler (to J. R. Geigy A.G.).
- Dyeing glass fibers by treating with unhardened soluble products produced by the interaction of formaldehyde and a compound which contains not more than 6 hydrogen atoms, only one atom group. —N=C—(N=) is not of cyclic character and which consists of elements the atomic weight of which is not greater than 16 and which contains in its molecule in relation to carbon less oxygen than urea, and then treating the material with a water-soluble organic dyestuff which contains at least one sulfonic acid group. No. 2,462,428. Hans Rosti (to Ciba Ltd.).
- In the production of water dispersible titanium dioxide pigments, the step which consists in flocculating hydroclassified calcined titanium dioxide dispersed in an aqueous medium which is alkaline to chlorophenol red by addition of a water-soluble neutral alkali metal salt. No. 2,464,192. Walter R. Whately (to American Cyanamid Co.).

Canadian

- Water-soluble masking mixture for colour filling recessed markings comprising water print ink, corn-flour, castor oil, dextrine, and glycerine. No. 454,785. William Eugene Charles McGowan (to Amalgamated Wireless (Australasia) Ltd.).
- Making titanium dioxide pigments from sulphate-free solution of a halide of titanium containing a halide of iron and free halogen acid. No. 454,811. Benjamin Wilson Allan and William Everett Land (to Canadian Titanium Pigments Ltd.).
- Preparing seed for accelerating the hydrolysis of titanium salt solutions by forming a substantially sulphate-free solution of a halide of titanium containing a halide of iron and free halogen acid by attacking ilmenite with sulphuric acid, converting the resulting solution of sulphates into a solution of the corresponding halides and insoluble sulphate, removing the insoluble sulphate from the solution, introducing the solution of halide of titanium into a volume of boiling water sufficient to substantially dilute said halide of titanium solution and boiling. No. 454,812. Benjamin Wilson Allan and William Everett Land (to Canadian Titanium Pigments Ltd.).
- Preparing seed for accelerating the hydrolysis of titanium salt solutions. No. 454,813. Benjamin Wilson Allan and William Everett Land (to Canadian Titanium Pigments Ltd.).

Explosives

- Fuse powder including finely divided zirconium and finely divided sulphur. No. 2,461,544. Geo. C. Hale and David Hart.
- Explosive assembly which comprises a water-permeous shell, a water-absorbent material capable of forming an explosive composition including a sensitizer and a water-proof high explosive core. No. 2,463,709. David M. McFarland (to Atlas Powder Co.).

Canadian

- Fast burning delay fuse comprising a tube of rigid material and the mono-basic lead salt of 4:6 dinitroresorcinol. No. 454,648. George Morris and John Loudon (to Imperial Chemical Industries, Ltd.).

Inorganic

- Preparing pelleted iron-oxide type catalysts. No. 2,460,811. Elwyn P. Davies and Frank T. Eggertsen (to Shell Development Co.).
- Treating an ore material containing both molybdenum and tungsten to recover a molybdenum compound by digesting with an aqueous solution of an alkali metal. No. 2,460,974. Michael C. Carosella (to U. S. Vanadium Corp.).
- Recovery of molybdenum compounds by adjusting the pH of an aqueous solution containing molybdenum and tungsten compounds and adding a mineral acid salt selected from the group consisting of sulphate, chloride and nitrate of a divalent metal selected from the group consisting of iron, nickel, cobalt and manganese. No. 2,460,975. Michael C. Carosella (to U. S. Vanadium Corp.).
- Production of titanium nitride by reduction of the titanium oxide, then admitting to the reaction zone a gas selected from the group consisting of nitrogen and ammonia, and converting the titanium metal to titanium nitride. No. 2,461,018. Peter P. Alexander (to Metal Hydrides Inc.).
- Production of zirconium nitride by reduction of the zirconium oxide, then admitting to the reaction zone a gas selected from the group consisting of nitrogen and ammonia, and converting the zirconium metal to zirconium nitride. No. 2,461,019. Peter P. Alexander (to Metal Hydrides Inc.).
- Production of tantalum nitride by reduction of the tantalum oxide, then admitting to the reaction zone a gas selected from the group consisting of nitrogen and ammonia and converting the tantalum metal to tantalum nitride. No. 2,461,020. Peter P. Alexander (to Metal Hydrides Inc.).
- Electrodeposition from an aqueous, tin-plating bath in the presence of a bath-soluble compound containing at least two 1,3-dioxolane groups. Allen G. Gray and William Franklin Gresham and Donald John Loder (to E. I. du Pont de Nemours & Co.).
- Sodium borohydride. No. 2,461,661. Hermann I. Schlesinger and Herbert C. Brown (to U.S.A. by U.S. Atomic Energy Comm.).
- Preparing an alkali metal borohydride by introducing an alkali metal alkoxide and diborane into a reactor. No. 2,461,662. Hermann I. Schlesinger and Herbert C. Brown (to U.S.A. by U.S. Atomic Energy Comm.).
- Preparing an alkali metal borohydride by introducing an alkali metal tetraalkoxyborate and diborane into a reactor. No. 2,461,663. Hermann I. Schlesinger and Herbert C. Brown (to U.S.A. by U.S. Atomic Energy Comm.).
- Electrodepositing zinc from an aqueous alkaline cyanide-zinc plating bath containing product of the reaction of piperonyl aldehyde and an aldonic acid to enhance brightness. No. 2,461,809. Allan E. Chester and Frederick F. Reisinger (to Poor & Co.).
- Separation of hydrogen peroxide from an aqueous mixture containing hydrogen peroxide and organic peroxides by heating until the organic peroxides are converted to organic acids and distilling. No. 2,461,988. Pieter Leendert Koolman (to Shell Development Co.).
- Oxychloride cementary material containing SiO₂, MgO, Al₂O₃, Cu₂SO₄·5H₂O, MgCl₂·6H₂O and H₂O. No. 2,462,030. Edward D. F. Whitehead (to Whitehead-Craft Corp.).
- Recovery and recycling of manganic sulphate paste in organic oxidations. No. 2,462,050. Bernhard G. Zimmerman (to General Aniline & Film Corp.).
- Forming crystalline anhydrous monocalcium phosphate free from pyrophosphate by reacting hot highly concentrated orthophosphoric acid with lime. No. 2,462,104. William Hugh Knox, Jr. Robert Taylor Cochran, William Remfrey Crudup and Warren Standish Miller (to Victor Chemical Works).

Stabilizing insoluble sulphur against reversion to the form which is soluble in carbon disulphide comprising dissolving a material selected from the group consisting of turpentine, pine oil, pine tar and rosin and mixing into initially free-flowing and non-caking sulphur consisting predominantly of insoluble sulphur. No. 2,462,146. Raymond H. Walcott and Alvin Schalliss (to Stauffer Chemical Co.).

Simultaneous generation of chlorine dioxide and nitrogen trichloride by bringing hydrogen chloride into contact with a chlorine radical and an ammonium radical. No. 2,462,194. Willis S. Hutchinson (to Mathieson Chemical Corp.).

Manufacture of silica hydrogel. No. 2,462,236. Chas. L. Thomas (to Universal Oil Products Co.).

Preparing an activated magnesium oxide by suspending magnesium hydrate impregnated with organic matter adsorbed from sugar liquids, in water; bubbling gaseous carbon dioxide through to form magnesium bicarbonate; boiling to form insoluble magnesium carbonate; removing said magnesium carbonate; and thereafter calcining to transform the same into activated magnesium oxide. No. 2,462,277. John J. Naugle.

Purification of crude sulphur hexafluoride containing as impurities at least one water-soluble acid reacting constituent and lower fluorides of sulphur including SbF_5 , which comprises first washing the crude gas with an aqueous wash liquor containing KOH, heating, thereafter again washing the gas with an aqueous wash liquor containing KOH, and drying. No. 2,462,379. John F. Gall (to Pennsylvania Salt Mfg. Co.).

An infra-red phosphor consisting of lanthanum oxysulphide and a double activator of the group consisting of europium coupled with a member of the group consisting of lead, bismuth, samarium, gadolinium and indium and of indium coupled with a member of the group consisting of lead, bismuth, copper and samarium. No. 2,462,547. John J. Fitha and Roland Ward (to Polytechnic Institute of Brooklyn).

Removing hydrogen fluoride-boron trifluoride catalysts from combinations thereof with aromatic aldehydes by admixing a metal fluoride of the class consisting of alkali metal and alkaline earth metal fluorides with a composition comprising an aromatic aldehyde and a hydrogen fluoride-boron trifluoride catalyst. No. 2,462,739. Wm. F. Gresham (to E. I. du Pont de Nemours & Co.).

Manufacture of adsorbent silica gel. No. 2,462,798. Robt. C. Wilson, Jr. (to Socony-Vacuum Oil Co., Inc.).

Electrodeposition of copper consisting of an aqueous solution of copper sulphate, sulphuric acid, molasses and thiourea. No. 2,462,870. Frank R. Keller (to General Motors Corp.).

Producing a non-abrasive form of titanium oxide from the vapor phase oxidation of a gaseous titanium halide in the presence of a volatile compound of a non-metal element selected from the group consisting of sulphur and phosphorus. No. 2,462,978. Ignace Joseph Krcchma and James Eliot Booge (to E. I. du Pont de Nemours & Co.).

Manufacture of a catalyst comprising alumina and another catalytically active oxide of a metal. No. 2,463,072. Glenn M. Webb and Marvin A. Smith (to Universal Oil Products Co.).

Producing liquid anhydrous hydrogen chloride by distillation. No. 2,463,188. John W. Latchum, Jr. (to Phillips Petroleum Co.).

Recovery of sludge acids (H_2SO_4). No. 2,463,204. Gustave T. Reiche.

Product for producing a silver surface catalyst consisting essentially of silver oxide containing coprecipitated silver halide. No. 2,463,228. Theo. John West and James Pearson West (to Allied Chemical & Dye Corp.).

Alkaline dry cell comprising an amalgamated zinc anode, an immobilized alkaline electrolyte and a cathode comprising a solid electrolytically dissociable oxygen-yielding permanganate and a more conductive material admixed therewith. No. 2,463,316. Samuel Ruben.

Separating and recovering liquid titanium tetrachloride from its mixture with iron chlorides comprising treating said mixture with superheated titanium tetrachloride to effect complete vaporization and then condensing the vaporous product. No. 2,463,396. Ignace Joseph Krcchma (to E. I. du Pont de Nemours & Co.).

Cadmium pyrophosphate phosphor. No. 2,463,449. Ferd E. Williams (to Radio Corp. of America).

Nitric acid concentration in the presence of an alkaline earth metal nitrate. No. 2,463,453. Alling P. Beardsley (to Chemical Construction Corp.).

Oxidizing acidic sulphur compounds occurring in petroleum with free oxygen in the presence of an alkaline polyhydroxy alcohol solution containing a phenolic material capable of forming a quinone upon oxidation and water. No. 2,464,019. Donald C. Bond and Michael Savoy (to Pure Oil Co.).

Canadian

Dehydrogenation catalyst for dehydrogenating terpenes in the vapour phase, comprising chromium oxide on an alumina support. No. 454,601. James Kenneth Dixon and Donovan Joseph Salley (to American Cyanamid Co.).

Means for the detection of hydrofluoric acid vapour in the atmosphere consisting of an absorbent body impregnated with a mixture of a solution of crystalline zirconium nitrate in pure distilled water and a solution of sodium alizarin sulphate in ethyl alcohol. No. 454,618. Christopher Phillip Fagan (to Canadian Marconi Co.).

Synthetic corundum. No. 454,628. George H. Smith (to Dominion Oxygen Co., Ltd.).

Producing sodium monosulphide by heating a fused mixture of sodium carbonate, sulphur, and a hydrocarbon material. No. 454,735. Owen F. Sprague (to Mathieson Alkali Works).

Activated aluminum hydroxide including magnesium sulphate, and an acid. No. 455,126. Victor H. Roehrich.

New catalyst comprising a zinc aluminate support having the formula ZnAl_2O_4 and an active catalytic material. No. 455,223. Kenneth K. Kearby (to Standard Oil Development Co.).

Leather

Manufacture of a tanning agent by heating a high-molecular non-dyeing sulphurized phenol with oxygen in an aqueous alkaline solution containing free sodium hydroxide. No. 2,461,901. Valentin Kartaschoff (to Sandoz Ltd.).

Metals

Mixture consisting of sodium chlorite and sodium hydroxide for blackening copper and copper alloy surfaces. No. 2,460,896. Walter R. Meyer (to Enthone, Inc.).

Rendering aluminum and aluminum alloy surfaces corrosion resistant by contacting with an aqueous solution consisting of water and an alkali metal chlorite, an alkali metal chromate and an alkali metal carbonate. No. 2,460,897. Walter R. Meyer (to Enthone, Inc.).

Coloring copper and copper alloy surfaces with an alkali metal chlorite, an alkali salt having an alkalinity equal to, or greater than, that of tetrasodium pyrophosphate but less than that of caustic soda or caustic potash. No. 2,460,898. Walter R. Meyer (to Enthone, Inc.).

Producing metallic magnesium from its ore by smelting with carbon, removing the carbon monoxide and magnesium vapor and oxidizing the carbon monoxide to carbon dioxide and the metallic magnesium to magnesium, separating the carbon dioxide and magnesium, reducing the separated magnesium to magnesium by reaction of the reduced smelted ore including the silicon. No. 2,461,009. Lucien C. Sturbelle.

Recovery of zinc from its ores by smelting a mixture of zinc-containing material with carbon, aluminum and a flux. No. 2,461,697. Augustin L. J. Queneau.

Beneficiating oxidized iron ores by froth flotation with a collector and an inorganic acid substance, the effective collecting constituent being a sulfonated residue from the refining of glyceric oils and fatty acids. No. 2,461,875. Robert Ben Booth and Earl Conrad Herkenhoff (to American Cyanamid Co.).

Treating magnesium and magnesium alloys in molten state for degassing by introducing sodium silico fluoride and hexachloroethane. No. 2,461,937. Kossy Strauss (to Foundry Services Ltd.).

Recovering manganese from manganese ores by leaching with an aqueous acidic solution of a ferrous salt of the group consisting of ferrous sulphate and ferrous chloride, removing the solids, raising the pH, thereby precipitating ferric hydroxide, removing the precipitate, and recovering a manganese product from the filtrate. No. 2,462,499. Richard D. Hoak (to Mellon Institute of Industrial Research).

Producing aluminum by continuously passing a fluidized mixture of alumina and carbon through a reduction zone wherein a reducing temperature is maintained and aluminum is vaporized, chilling the effluent vapor product containing the reduced aluminum and carbon monoxide by the addition thereto of a coolant consisting of fluidized alumina, separating the bulk of the carbon monoxide from the chilled material, distilling off the aluminum and passing the distillation residue consisting of alumina to the reduction zone. No. 2,462,661. John C. Munday (to Standard Oil Development Co.).

Addition agent for treating molten ferrous metal composed of silicon-containing alloy, said alloy containing silicon, manganese dioxide and an alkaline sodium compound. No. 2,462,871. Augustus B. Kinzel (to Union Carbide and Carbon Corp.).

Preparing selenium by mixing zirconium tetrachloride and selenium dichloride, heating in a vacuum, cooling, dissolving the cooled mixture in purified selenium. No. 2,462,949. Floris de Boer (to Hartford National Bank and Trust Co.).

Producing pure tungsten crystalline grains directly from oxide tungsten ores by mixing with molten sodium tetraborate at 950° and 1300° C. and electrolyzing. No. 2,463,367. Colin G. Fink and Chuk Ching Ma.

Recovering zinc from zinciferous material containing iron by vaporizing zinc from the molten mixture. No. 2,463,468. Frank F. Poland (to Revere Copper & Brass, Inc.).

Silver coating an organic plastic surface by applying to the surface an organo metal halogenide and further treating with a reducible silver solution and a reducing agent. No. 2,464,143. Lawrence E. Martinson and Kuan-Han Sun (to Eastman-Kodak Co.).

Canadian

Treatment of titaniferous ores by leaching an iron-bearing titaniferous ore with hydrochloric acid to obtain a residue consisting of the titanium constituents and a solution containing the iron constituents, separating, adding an alkaline reacting calcium compound to precipitate the iron from solution, separating, adding sulphuric acid to precipitate the calcium as calcium sulphate, and returning the regenerated hydrochloric acid to a subsequent leaching. No. 454,619. Bernard Freeman (to Canadian Titanium Pigments Ltd.).

Recovering molybdenite by froth flotation. No. 454,695. Thomas A. Janney, Charles M. Noaker and Alpha G. Johnson.

Removing sulphur from nickel-containing material by introducing solid comminuted nickel-sulphur-containing material into a mass of molten caustic soda. No. 455,194. Clarence George Bieber and Eugene Joseph Kalil (to International Nickel Co. of Canada, Ltd.).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

BARKER. Lacquers, lacquer thinner, alcohol type solvents, synthetic paints synthesized from phthalic alkyl resins and paint enamels and oil base paints. 442,196. Barker Chemical Co.
DIDIT. Insecticide. 491,359. Phoenix Chemical Co.
RATOMIC. Rat and mice poison. 498,410. Howard W. Fay.
DOCKILZUM HIS PATIENTS ALL DIE. Ant syrup, insect powder, moth spray, fungus

solution, moth crystals, bed bug spray, fly spray, roach powder, rodent grain, phosphorus paste, poison grain, and sodium fluoride. 501,925. Paramount Pest Control Service.
SANISHEEN. Floor wax. 502,769. Sanitek Products Co.
SOAC. Rubber compounding material. 502,802. Chemico, Inc.
PESTMIST. Chemicals for pest control. 502,911. Michigan Chemical Corp.

PSC. Cleaning compounds and solvents for cleaning ferrous and non-ferrous metals. 506,154. Phillips Chemical Co.
TREATMENT SERVICE ENGINEERING CO. Water treatment chemicals. 507,096. James Howard Heal.
YOUR SHOES ARE SHOWING. Shoe polish. 507,118. Best Foods, Inc.
MIDWEST'S CLEAN-IT. Cleaning crystals. 507,311. Floyd S. Young.
CLEANSERTAG. Paper treated with melamine, ureaformaldehyde, or similar synthetic resins. 507,494. Hollingsworth and Vose Co.
EXORAD. Soot eradicator. 509,914. Butler Engineering Co.
WONDER. Weed killer and insecticide. 509,973. Cook Chemical Co.
NEU-EMAIL. Liquid paint enamel. 512,130. Nu-Enamel Corp.
COLOR-CRAFT. Dye composition for coloring natural flowers. 512,781. Dwight S. Kearney.

STAN-TONE. Coloring pigment to be incorporated in plastics. 513,885. Harwick Standard Chemical Co.

KOTOL. Solvent solutions of synthetic resins for protective coatings. 514,314. U. S. Rubber Co.

CHEE. Washing Powder. 514,964. Alexander R. Patterson.

SUPER-IRIDE NERO. Dyeing preparation for cloths. 515,742. Alpo Benelli and Augusto Benelli.

DEGREASOL. Liquid solvent and cleaner for removing tar, wax, oil, and grease. 516,376. Practical Products Co.

CAPSUDS. Concentrated soap. 516,585. Sugar Beet Products Co., Inc.

PORTEX. Synthetic resin plastics. 516,917. Portland Plastics, Ltd.

ADVAGUM. Plastic masses having rubber-like properties. 517,683. Advance Solvents and Chemical Corp.

MASON-DRI. Ready mixed paint. 519,035. Sapolin Paints, Inc.

WARREN. Paints in ready-mixed form. 519,243. Warren Co., Inc.

WETTA WATER. Chemical to be added to fire fighting liquid to lower its surface tension. 520,249. Arnold, Hoffman and Co., Inc.

"FAIRY" DYE. Chemical dyestuffs. 520,501. Fairy Dyes Ltd.

PENNSALT WHIRLAWAY. Cleaning composition for clearing drains. 521,401. Pennsylvania Salt Manufacturing Co.

WHIRLAWAY. Cleaning composition for clearing drains. 521,400. Pennsylvania Salt Manufacturing Co.

IFFIX. Ammonium thiosulfate fixing bath. 522,524. Mallinckrodt Chemical Works.

DUTRIX. Household cleaner. 522,931. Elizabeth Weston Parker.

WHITEWALLS. Cleaning fluid for removal of road tars and oils from automotive vehicles. 523,400. Lyon, Inc.

HALOWAX. Synthetic oil and solid derivatives thereof for use as additives for gasoline to prevent and eliminate gum deposits. 524,836. Union Carbide and Carbon Corp.

SUNOCO. Chemical anti-friction compound for rubber mountings or fittings; insecticides; shock absorber fluid; anti-freeze; radiator stop leak compound; chemical radiator cleaner; chemical radiator rust resistor and brake fluid. 525,420. Sun Oil Co.

WILSON. Gas absorbers, specifically, sodium-calcium-hydrate. 526,701. Dewey and Almy Chemical Co.

NATEX. Plastic paints. 526,703. National Chemical & Manufacturing Co.

SYMBOL. Sulfonamide, acetic anhydride, acetone, etc. 526,919. Mallinckrodt Chemical Works.

MALLINCKRODT. General chemicals. 526,920. Mallinckrodt Chemical Works.

WHITE CROSS. Bleaching and disinfecting solutions. 526,984. H. M. Sinclair, Jr.

SINCLAIR'S. Chlorinated lime. 527,004. H. M. Sinclair, Jr.

PARKER. Writing ink. 527,344. Parker Pen Co.

MINNOLEUM. Varnish. 527,677. Minnesota Linseed Oil Paint Co.

SHOWER BAR. Sudsing cleaner, cleanser, and detergent. 527,932. The Hewitt Soap Co., Inc.

TANNATHIN. Chemical goods consisting of additives for well drilling muds. 528,085. Magnet Cove Barium Corp.

START. Water solvent, dehydrating agent, rust inhibitor, corrosion inhibitor, and antifreeze agent. 529,328. Winklenwerder & Ladd, Inc.

PANTHER. Friction tapes and rubber adhesive tapes. 530,332. Okonite Co.

RADIANT. Sudsing detergent. 530,563. Procter and Gamble Co.

SPIRCO. Liquid non-slip polish. 532,142. Walker G. Legge Co., Inc.

PAYDET. Detergent compound. 533,097. Wyandotte Chemicals Corp.

C.C.S. ALKALI. Alkaline detergent compound. 533,098. Wyandotte Chemicals Corp.

B.C.X. SPECIAL. Alkaline detergent. 533,099. Wyandotte Chemicals Corp.

EMILON. Cleaning compound for metal cleaning. 533,192. Wyandotte Chemicals Corp.

DIAZOPHENYL. Dyestuffs. 533,159. Geigy Co., Inc.

HUBER. Printing inks. 534,630. J. M. Huber Corp.

THREDKUT. Cutting oils. 534,690. D. A. Stuart Oil Co., Ltd.

SETFAST. Printing inks and offset compounds. 534,784. Interchemical Corp.

DOLE. Citric acid. 537,454. Hawaiian Pineapple Co., Ltd.

PAWNEE. Ready mixed barn paints. 538,077. Armstrong Paint & Varnish Works.

ZYROX. Synthetic resins for compounding and processing rubber. 538,830. Union Carbide and Carbon Corp.

RESITOX. Insecticidal foliage spray oil. 538,965. Shell Oil Co., Inc.

ESSKOL. Drying oils. 539,358. Spencer Kellogg and Sons, Inc.

GRANDEUR. Paint enamel. 539,659. Continental Paint & Varnish Co.

TREADWELL. Floor varnish. 539,665. Continental Paint and Varnish Co.

ZINCAPONE. Paint in paste form. 539,667. Continental Paint and Varnish Co.

DRAKE. Liquid resinous paint. 539,675. Drake Paint Co.

TRINITE. Utility paint. 539,771. Stetson Paint & Varnish Co.

ELITE. Liquid paint enamel. 539,773. Stetson Paint & Varnish Co.

SHLACTOL. Liquid coating composition. 539,777. Stetson Paint & Varnish Co.

CORRU-KOTE. Paint in liquid and paste form. 539,778. Stetson Paint and Varnish Co.

STETSON. Paint. 539,785. Stetson Paint & Varnish Co.

DALITE. Detergent in liquid form for cleaning glass. 540,074. International Rustproof Corp.

FIFTY-FIFTY "50-50". Cleaning, disinfecting, germicidal, and deodorizing compound. 540,739. Vincent Tizio.

FT-600. Liquid obtained from pine wood used as a softener, tackifier, and dispersing agent in rubber. 540,773. Godfrey L. Cabot, Inc.

"67" LINE. Paint enamels. 540,910. The Sherwin-Williams Co.

TRIVEX W-50. Insecticide. 540,950. Westvaco Chlorine Products Corp.

LUB-BASE. Mixed fatty acids. 540,961. Armour and Co.

PARK AVENUE. Deodorant for use in households. 541,132. Mike S. Goldberg.

ROGERS. Dry and liquid adhesives. 541,183. Rogers Insulating and Glue Co.

NON WARP. Glue. 542,480. National Starch Products, Inc.

METSO. Cleansing compound containing silicate of soda. 544,653. Philadelphia Quartz Co.

TOWER. Photographic chemicals. 544,776. Sears, Roebuck & Co.

MAXIM EST. 1905. Chemicals. 544,890. Maxim Chemical Co., Inc.

BEEL'S. White shoe cleaner and shoe cream. 545,334. Bell Chemical Co.

SOVACIDE. Hydrocarbon solvent for hydrocarbon-soluble insecticides. 545,403. Socony-Vacuum Oil Co., Inc.

STAYBIND. Vegetable derivative adhesive. 545,783. A. E. Staley Mfg. Co.

BLU-MOTTLE. Soap. 545,919. John Wanamaker New York.

CLING GEAR GREASE. Gear grease. 545,979. Cling Gear Grease Co.

PERFEX. Dry cleaning preparation. 546,025. Perfex Co.

MOBO. Powered car washes. 546,330. John T. Stanley Co.

CONTOURE. Soap. 546,352. A. Breslaier Export Corp.

AZONE. Sodium hypochlorite solution for bleaching. 546,500. Kenneth L. Mueller.

NETBEST. Anti-fouling composition. 546,512. Oliver Reeder & Son, Inc.

NELEX. Polymerized rosin. 546,697. Glidden Co.

V-SPECIAL. Silicate of soda. 547,401. Philadelphia Quartz Co.

PERFECTION. Paint cleaner. 547,420. John H. Bartley and Co.

RACALAN. Soap substitutes and cleaning preparations. 547,519. Deodor-X Co. of England Ltd.

TEMBRITE. Cleaning compound in powdered form having incidental water softening properties. 547,520. The Diversey Corp.

NET-LIFE. Chemical compounds for preservative treatment of fish nets. 547,579. Techkote Co.

RUB-ER-RED. Red iron oxide adapted especially for rubber manufacture. 547,595. C. K. Williams and Co.

DISHBRITE. Cleaner and detergent for dishes. 547,956. Allied Home Products Corp.

KESSCO. Monohydrate alcohol, polyhydric alcohol, and glycol esters. 548,000. Kessler Chemical Co., Inc.

BLACK DIAMOND. Belt dressings. 548,322. The Black Diamond Paint and Varnish Works, Inc.

DC. Organo-siloxane resins. 548,344. Dow Corning Corp.

RINSEA. Ester of tall oil. 548,665. National Southern Products Corp.

OAKITE. Chemical compounds having water softening qualities. 548,674. Oakite Products, Inc.

ALRO SEQUESTRENE. Chemical compositions used for converting polyvalent ions to a water-soluble but deionized condition. 548,704. Alrore Chemical Co.

AIR-TINT. Liquid air purifier and cleanser of a chemical nature. 549,630. Gift of the Month, Inc.

PENPHOS. Insecticides. 549,657. Penn. Salt Manufacturing Co.

PENNSALT ACID FOAMER. Addition agent for aqueous acid pickling baths to produce a gas permeable cover on such baths. 549,661. Pennsylvania Salt Manufacturing Co.

EVERGREEN. Disinfectant. 549,828. Murphy Laboratories, Inc.

D'ORSAY. Soaps. 550,586. D'Orsay Perfumeries Corp.

GOLDEN KEY. Liquid preparation for removing spots from fabrics. 550,687. The Great American Tea Co.

GOLDEN KEY. Laundry washing powder having incidental bluing properties. 550,688. Great American Tea Co.

OLD DUTCH CLEANSER. Soap powder

combined with mineral ingredients. 550,790. The Cudahy Packing Co.

OLD DUTCH. Soap powder combined with mineral ingredients. 550,791. The Cudahy Packing Co.

CARCO PRODUCTS. Soap, soap powder, washing powder, liquid detergents. 552,221. Carman and Co., Inc.

PROSPERITY PRODUCTS. Soap, soap powder, washing powder, powdered detergents. 552,222. Carman and Co., Inc.

SYMBOL. Chemical fluxes and compressed gases. 552,477. National Cylinder Gas Co.

NCH. Chemical fluxes and compressed gases. 552,485. National Cylinder Gas Co.

RHOPLEX. Resin suspensions or dispersions suitable for use in wax formulations, polishes, and the like. 552,803. Rohm and Haas Co.

FLUXOL. Brazing and soldering flux. 553,139. Standard Metals Corp.

COLOREX. Stripper preparation, containing titanium trichloride, titanium tetrachloride, zinc chloride, hydrochloric acid, water and stabilizer, used by dyers and dry cleaners for stripping colors from fabrics. 553,417. Stauffer Chemical Co.

IBON. Phenolic resin for a core binder. 553,621. Interlake Chemical Corp. of Delaware.

ALIPHAT. Fatty acids. 554,660. General Mills, Inc.

PHOTACT. Chemicals used in processing photosensitive products. 554,797. Keuffel and Esser Co.

MULTI-KLEN'R. Liquid cleaning compositions for cleaning typewriters. 554,804. The Multistamp Co., Inc.

ALUMINUX. Cleaning compound in pulverulent form. 555,803. The Diversey Corp.

JOFLEUR. Chemicals for treating and preserving flowers and foliage. 555,944. Jofleur, Inc.

TAFON. Soapless cleanser. 556,932. Triangle Chemical Co.

ARBITOL. Hydroabietyl alcohol. 557,356. Hercules Powder Co.

GLUTRIN. Chemical compound useful as an emulsifying and dispersing agent for insecticides, road oils, and other uses. 557,389. Robeson Process Co.

MONSANTO. Inorganic phosphates and alumina for general use as abrasives and polishing agents. 557,547. Monsanto Chemical Co.

DIVOLUME. Cleaning compound for cleaning aluminum. 557,734. Diversey Corp.

DUOMERSE. Synthetic detergent compositions. 557,862. Monsanto Chemical Co.

FEROX. Chemical composition for use as rust remover. 557,872. Service Industries.

PINEY WOODS. Flotation oils, pine oils, and pine tar oil. 558,135. Glidden Co.

VICAREX. General cleanser. 558,425. Virginia-Carolina Chemical Corp.

"PENNY WISE". Detergent for general household use. 558,786. Hans Jacob Heckmann.

LEATHERCRAFTER. Liquid cleanser for leathers and simulated leathers. 558,796. Kurt Lehmann, Jr.

W-P. Bleach having incidental cleaning, deodorizing, and disinfecting properties. 558,974. Waples-Platter and Co.

ALLI. Liquid Soap. 559,234. The Lincoln Industrial Chemical Co., Inc.

STERALLI. Liquid soap having sterilizing properties. 559,235. The Lincoln Industrial Chemical Co., Inc.

BLUE STAR. Anti-freeze coolant. 559,245. Prairie States Oil & Grease Co.

KATHON. Synthetic organic chemicals for controlling the growth of and/or eradicating plants. 559,325. Rohm and Haas Co.

TALLSO. Crude tall oil (talloil) soap. 559,408. West Virginia Pulp and Paper Co.

R. Coal tar dyestuffs. 559,736. H. P. Rosiger & Co., Inc.

HAMIKLEEN. White, crystalline alkali for cleaning metal. 560,104. Haas-Miller Corp.

USAMINE 59. Preparation having disinfecting and deodorizing properties for general use in cleaning and sanitation purposes. 560,235. U. S. Sanitary Specialties Corp.

ZETAX. Accelerators for the vulcanization of rubber. 560,701. Goodyear Tire and Rubber Co.

NACCOTAN. Preparation used in tanning and for control of resinous matters in the manufacture of paper. 560,954. Allied Chemical and Dye Corp.

WARCONYL. Chemical compounds for rendering textiles fire retardant. 561,350. Sun Chemical Corp.

SNOAP. Chemical cleaning powder. 562,062. Hysan Products Co.

AIRESS. Household cleanser. 563,188. KBG Products Co.

DOWEX. Ion exchange resins. 563,245. Dow Chemical Co.

DERIPHAT. Fatty amines. 563,519. General Mills, Inc.

TROMEX. Degreasing solvents. 563,961. Westvaco Chemical Corp.

SKYDROL. Hydraulic fluids. 568,111. Monsanto Chemical Co.

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